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Regrassing Silted Areas.

Combating Flood Damage on the East Coast.

E. M. Bates, Instructor in Agriculture, Fields Division.

Fig. 1.—Silted paddocks in the Gisborne district after the flood-waters had subsided considerably and at a stage when sowing was carried out.

OBSERVATIONS over a period of years both in New Zealand and Australia indicate that heavy rains and flood conditions frequently follow a dry season. Following the dry conditions that have ruled generally over the last year, this autumn has been noteworthy for the disastrous flooding that has occurred in parts of both the North and South Islands.

The experiences of regrassing silted areas in Poverty Bay this autumn is of interest in view of the later flooding on the East Coast generally. On the 19th February a heavy rainstorm swept the coastal watersheds of the Poverty Bay and East Coast districts, causing loss of life, loss of stock, and extensive damage to property and fencing, besides leaving some 2,000 acres to 3,000 acres of pastures silted to various depths from a light dressing to more than 5 ft.

In many cases the silting caused much immediate hardship, especially to the smaller dairy-farmer, while additional labour for fencing and cleaning up will be an added burden.

While the silt generally will eventually be beneficial, regrassing presented an

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Fig. 2.—Silted paddocks and debris near a farmhouse.

Fig. 3.—Debris and silt left by the flood at a ruined fence.

Fig. 4.—Pastures silted in places to a depth of 5 ft.

immediate problem. After the experiences of a flood in 1932, which also occurred in February in the Poverty Bay area, about 60 per cent. of the areas silted were resown by hand as soon as flood-waters subsided. The seed was, in fact, broadcast in some cases only three days after the flood.

Germination following immediate sowings was generally very good, the greatest fault being due to uneven distribution of seed. Some of the more lightly silted areas dried rapidly and would have been more profitably cultivated, as the sowing season was only commencing. On some such areas where sowing was delayed unduly, germination was not satisfactory. Seed could hardly be expected to germinate on a surface rapidly drying and cracking into hard blocks. Birds took their toll, and much seed lying ungerminated on the dry surface was swept into cracks by later rains. It follows that if sowing without cultivation is to be carried out, it should be done immediately.

Early Sowing Essential.

Early sowing is essential to obtain a quick, even strike and to give the plants a chance to take hold before cracking and baking of the crust develops. Extensive cracking of the surface, in any case, develops with the finer, deeper silts, which may be extremely slow drying, but the cracks soon become filled in as the areas are able to carry stock. Other areas, especially those which were capable of drying out in reasonable time, were left until disking and harrowing could be carried out, and excellent strikes, followed by vigorous growth and freedom from volunteer weed-growth, have been obtained without the disadvantage of a cracked and baked crust slowing up growth of the young pasture plants.

A comparison between the February, 1932, flood and the February, 1938, flood, both in Poverty Bay, illustrates the importance of the weather conditions following the silting.

Immediately after the 1932 flood almost incessant rain fell over a long period, and many farmers regretted that they had not sown down on the wet silt instead of waiting until they could work the ground. After the February flood in Poverty Bay this year, however, three weeks of fine weather prevailed, and much of the silt dried out rapidly—in many cases too rapidly—and under the circumstances a larger area would have been better if cultivated, but farmers in general considered immediate sowing quicker, easier, and safer. Rain fell later on several occasions, to the benefit of the areas sown on the silt. Cultivated areas, however, should come into quicker profit than areas sown on the wet silt.

Fig. 5.—A subdivision fence left high and dry by a slip.

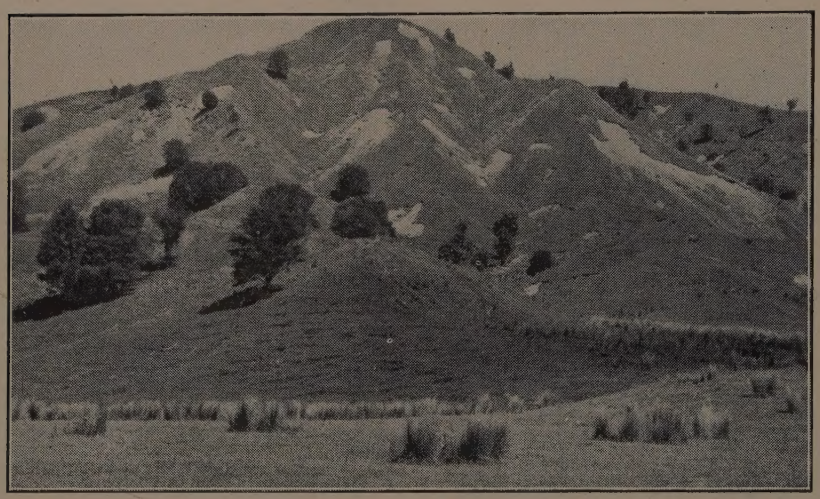

Fig 6.—Slips on the East Coast country, showing the scarred nature of the hill country.

Fig. 7.—Tall fescue germinating from the silt. Note the partially buried fence.

Prior Cultivation.

In February tall fescue was seeding on much of the land adjoining the rivers on the East Coast, and a heavy crop of seed was soon germinating on many silted pastures, particularly where the ground was previously occupied by this weed-grass. Disking and harrowing in dry weather before resowing in such cases was clearly indicated.

It is apparent, that if it is considered, a silted area will dry out rapidly—especially if the silt is fine and liable to bake or if there is fear of invasion of weeds, such as tall fescue, rushes, &c.—it would be advisable to cultivate before sowing.

The Poverty Bay flood of February occurred at an optimum time as far as the re-establishment of pastures was concerned. Few farmers on the flat country sow other than in the autumn, and prefer March and April sowings, though sowing is also carried out in May. Spring sowings are avoided, but early spring sowing of pastures is undertaken to a limited extent.

Hawke's Bay Problem.

A further misfortune following the tragic flood in Poverty Bay is the disastrous flood of the 26th April which caused extensive damage to Hawke's Bay, where some thousands of acres are affected, and also caused further resilting and other damage in Poverty Bay. This flooding comes at a less favourable time, as the period of sowing is necessarily more limited and weather conditions are becoming more unfavourable as sowing season draws to a close. There is little margin left for possible cultivation work if sowing with cultivation is considered before winter sets in. Even the most optimistic can hardly hope that the ground will dry out sufficiently at this period, especially with the deeper, finer silts, to allow for cultivation or will be sufficiently consolidated for the use of horses.

The heavily silted areas should be sown down immediately the flood-waters have subsided—the sower walking bare-footed in the wet silt to distribute the seed by hand. Broadcasting both ways ensures a more even distribution of seed. It is probably not possible at this late date to use horses and cultivating implements except on the more lightly silted areas where there is a reasonable prospect of the silt drying out quickly enough, so that sowing will not be delayed until too late in the season, say by the end of May at the latest.

Quick Action Necessary.

Many areas will be left over the winter, and possibly a spring crop of oats, followed by autumn-sown pasture, will

Fig. 8.—A view of an old slip, showing the ingress of manuka on country subject to manuka.

Fig. 9.—Paspalum coming through the silt.

be fairly general in the Hawke's Bay District. Many of the Hawke's Bay silted areas are required for the certification of rye-grass, and only certified pedigree and mother seed would be considered for sowing. Such seed is in short supply, with prices unfortunately enhanced, and resowing will constitute an expensive item, as more than 2 bushels per acre of rye-grass and white clover are required. Much of the silted area is again covered with debris, which will further delay sowing. The rehabilitation of the pastures, however, is the urgent problem, and quick action is necessary by all concerned.

A most interesting feature of the flooded areas on the East Coast is the ability of paspalum to survive silting of moderate depths. Where the climate is suitable and there is no objection to paspalum because of areas being kept for rye - grass - seed production, paspalum should be sown on land more or less liable to inundation. Rapid autumn growth has been made by paspalum on silted pastures in the East Coast districts, where this plant was present, and it has undoubtedly proved of the greatest value.

Coastal Hill Slips.

Due to the floods, much slipping has also taken place on the coastal hill country of the East Coast. The pasture generally is a danthonia dominant with a sprinkling of English grasses and clovers, with ratstail strong in many places. This country is particularly liable to erosion and has suffered severely, the numerous slips greatly reducing the pasturage as well as interfering with fencing. Some regrassing of the more stable slips should be carried out, and a mixture of rye-grasses, white and subterranean clovers, and paspalum should be broadcast. On areas where manuka may be kept in check on the hills it will make its appearance in the slips and will take charge, as illustrated in the photograph of an older slip at Tolaga Bay.

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Fig. 10.—Disking and harrowing before sowing.

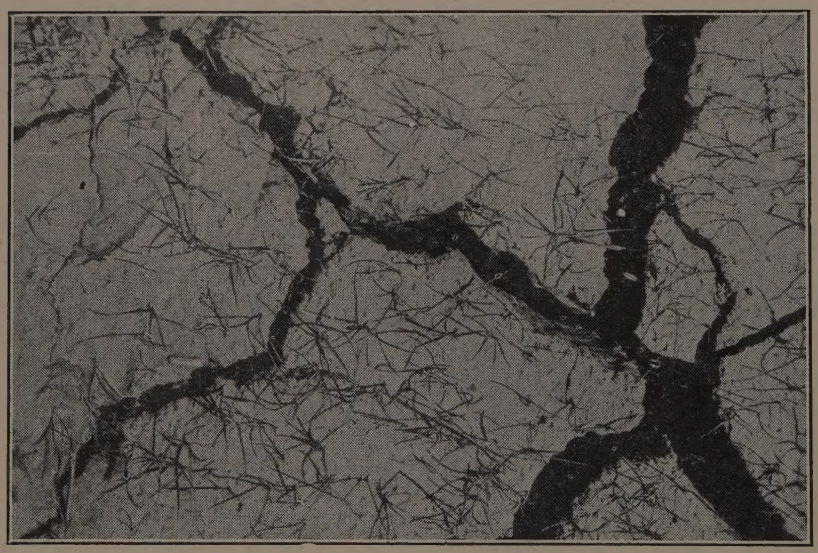

Fig. 11.—A grass-seed strike.

Although our immediate concern is with the regrassing of silted areas, there is still the greater problem which will have to be faced sooner or later—adequate afforestation of the hill country. Floods are becoming more frequent and disastrous now that the hill country has become largely denuded of its natural vegetation. Much has been rendered practically barren and incapable of retaining moisture, and heavy rainfall now sweeps down naked slopes unchecked, to leave some deposit along lower reaches but, in the main, to lose altogether the most valuable constituents of the hill country's finest soil into the maw of the sea.

Balance of Nature.

The immediate problem must not absorb our whole attention or blind our sight to the needs of future progress and to the fact that we must make united effort in some measure to restore the balance of Nature so rudely upset by the destruction of the forests.

Sooner or later we must tackle the problem as a whole and ruthlessly pursue a definite policy if the farming community is to enjoy security and prosperity.

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Navel Ill in Foals.

W. D. Blair, District Superintendent, Canterbury.

NAVEL ill in foals is undoubtedly the cause of heavy financial loss and bitter disappointment to the draught-horse breeders of the Old World. Even in New Zealand, where conditions are totally different, in that foaling as a rule takes place in the open and therefore a clean paddock can be selected for the event, cases are by no means uncommon.

As is the case in all conditions in which no one definite causative agent has been determined and thus no recognized line of attack as regards treatment can be advocated, many and varied are the opinions expressed by breeders and others regarding the cause and treatment. One peculiarity of the disease is noteworthy, and that is that in this country it is rarely seen in light horses or ponies. I cannot express an opinion as to why this should be, but the fact remains that while draught foals may be affected, foals from light mares kept under similar conditions and foaling in the same paddock as the draughts remain unaffected.

Colt suffering from chronic navel ill. Note the swelling of the right carpel and left tarsal joints.

Hereditary Factor.

Liability to the disease increases with the betterment of the breed. Heredity, as a factor, cannot to my mind be altogether ruled out, though authorities on the subject hold that the heredity theory has never been definitely established. Against this the fact remains that certain mares in successive years will throw foals with enlarged joints at birth.

In a number of cases regarded as hereditary it has been demonstrated that the progeny of the dams have an abnormally large umbilical ring, which necessarily takes longer to heal, and the risk of infection is increased. In others, again, it has been shown that the trouble arose through the mares foaling year after year under the same conditions and surroundings.

In some years this disease, like many others of an infectious nature, prevails like an epidemic in certain districts. Cases occur on neighbouring farms, especially on those of breeders of stud stock, and in this connection climatic conditions apparently play no part. Idleness during the pregnancy period has always been regarded as a predisposing cause. It is a recognized fact that mares worked in a rational manner throughout that period are less prone to trouble at foaling-time.

In dealing with the trouble it should be stated straight away that all endeavours should be on preventive lines, as curative treatment is in the majority of cases useless. The death-rate is estimated at more than 50 per cent., and of the remainder the percentage of complete recoveries is small. Those that survive are unthrifty or bad doers for a long time, and some permanently so. In others, the enlarged joints remain permanently enlarged.

Navel Ill or Joint.

Ill, as it is sometimes called, may be defined as an acute infectious disease of newly-born animals, characterized by abscess formation in various joints, most frequently the stifle, hock, and knee, the stifle being the commonest seat. Abscesses may form in the internal organs, especially the liver and lungs.

Causes.

A variety of organisms may act as the causative agents, and, while in most cases infection enters the body through the navel, it is known that one particular organism can infect by ingestion. Again, wounds and abrasions act as portals for the infection.

Excluding the few cases in which enlarged joints are found at birth, the first symptoms usually make their appearance within ten days of birth, and these symptoms vary according to the virulence of the attacking organisms. As a rule, the first noticeable sign that all is not well is the foal's refusal to suckle. The animal looks depressed, and, as one might say, "looks mighty sorry for itself." The recumbent position is assumed, and there is no desire on the

animal's part to move about; the temperature is higher than normal, and the breathing is accelerated.

Examination of the navel may reveal nothing, or the part may be hot and painful, with or without a discharge. If the joints are handled some of them will be found to be swollen, hot, and painful. Later on, these swellings burst, liberating blood-stained pus. Rapid loss of condition is a marked symptom.

In some cases none of the general symptoms as denoted are observable, and here the disease takes the form of blood-poisoning, characterized by high fever, severe diarrhœa, and blood in the urine. Death usually occurs in a few days.

Treatment.

From what has already been said, one may gather that in few cases can a radical cure be looked for, and it is hardly necessary to add that the services of a qualified veterinarian should be requisitioned, especially as surgical treatment is called for in most cases. In recent years quite a number of sera and vaccines have appeared on the scene, all guaranteed to effect cures, but I think most of them are of the hit-or-miss variety.

If one were certain of the particular organism causing the trouble vaccines prepared from that organism might give results, but to determine the organism and prepare the vaccine which can be done only in a laboratory takes time, and few cases admit of this. Vaccination of the mare prior to foaling is widely practised in England, and has its advocates, but likewise its detractors.

Prevention.

In medical and veterinary science throughout the world the trend now in dealing with disease is, if possible, to determine the cause, and having done so to remove or prevent it. There can be no question that navel ill is one of the conditions that should be tackled on preventive lines.

In the Old Country, where foaling invariably takes place in a loose-box, it has been shown beyond doubt that once a case occurs in a particular box others are sure to follow, no matter how scrupulously the box has been cleaned out and disinfected. It must be admitted, however, that the ordinary box is difficult to disinfect thoroughly, and in few places would the erection and maintenance of a box solely for the use at foaling-time be justified.

Foaling in Paddock.

In this country, however, foaling invariably takes place in the paddock, and therefore little excuse can be offered when a dirty paddock or yard is used. The usual excuse that it is handy to the farm is a poor one. The paddock selected should be small, *clean*, and without ditches or open drains, and the nearer the homestead the better, so that an eye can be kept on the mare when the event draws near. When, because of climatic conditions or other causes, a box has to be used it should be thoroughly cleaned out and bedded down with fresh straw.

A number of owners make it a practice to wash thoroughly the tail and hind-quarters of the mare with a 2-per-cent. Lysol solution just prior to foaling. This precaution appears to be a wise one, as one never knows where the infecting organisms may be found. Immediately the foal is dropped the navel and surrounding parts should be swabbed with methylated spirits and the cord tied close up, approximately ½ in. to the abdomen. The cord is then severed 1 in. or so from the tie. The string or tape used for tying should be sterilized before use, and the parts then painted with tincture of iodine. It is important that the hands of the operator should be thoroughly clean before operations commence. The navel should be dressed twice daily until it has healed.

Solution for Washing.

Some recommend the use of astringent solutions for washing after the first day. These are said to hasten the healing process, harden the stump, and thus reduce the risk of infection. A 2-per-cent. bluestone solution is the one generally used. As infection is known to occur through ingestion, the teats and udder of the mare should be watched and cleansed if necessary. In the cases where the mare has foaled and is not seen for some time afterwards, washing, &c., should be carried out, because as long as the navel remains unhealed the danger of infection is ever present.

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Some Principles of Cropping.

R. P. Connell, Land Utilization Officer

THE best economic results in the growing of crops are obtained consistently year in and year out only when the work is carried out in such a way that certain basic principles are not violated. Sometimes farmers follow these principles without even knowing that they have been enunciated as the result of field experience, just as in a similar way many of us follow the rules of logic without having made any formal study of the science of logic. In each case we have sound application of the results of good reasoning. In considering the principles of cropping it needs to be borne in mind that the primary objective is low cost of produce of appropriate quality.

Some of the main principles underlying efficient crop production may be stated as follows :—

1. *Low Unit-costs of Production are in General Associated with High Yields per Acre.*

To this principle there are exceptions of some importance, but, nevertheless, it is a principle which obtrudes itself in New Zealand farming, because New Zealand as a whole is a country of high land-values.

In general, the profitable tendency in farming is to economize in the factor which is the more costly or valuable as compared with the other factors of production. When land-values are high the rent or interest on the land is a high fixed overhead charge ; if the yield is markedly low, this fixed charge becomes an unduly heavy item in the cost of each unit of production.

To illustrate the principle, let us take a supposititious case of a root crop, worth 10s. a ton in respect to its feeding-value, grown on land of an annual cost of £4 an acre. According to the efficiency of the work, the yield on such land of such a crop as mangels may readily range from 20 tons to 80 tons per acre. In the larger crop the overhead cost of the land is 1s. a ton, quite a reasonable amount, while in the smaller crop it is 4s. a ton, which is an undesirably high proportion of the total value of the crop.

From the rule that the profitable tendency is to economize in the factor of production that is the more costly, two deductions of practical importance may be made. In the first place, if labour-costs were to increase progressively a point might be reached where it might not be sound policy to use the land intensively unless the position could be relieved by the introduction of labour-saving practices. In the second place, if land-values are low, land overhead charges are likely to be low relative to other charges, and the advisability of high yields per acre tends to discontinue. An illustration of this is provided in the case of South Island sheep-runs, of which the annual rent may be a few pence an acre—on such sheep-runs a 12 ton to 15 ton an acre root crop produced by extensive methods may readily be more economic than a crop of much heavier yield produced by intensive methods ; in either case the cost of the land would be less than 1d. per ton of the crop, a practically negligible amount.

The outstanding fact of the position is that in general land-values are high, hence the wide practical importance of the principle under consideration.

The foregoing remarks in regard to rent apply equally to all the other fixed charges incurred in ordinary cropping, including such items as ploughing, disking, harrowing, rolling, drilling, the purchase of seed and fertilizer, and, maybe, thinning and weeding. The total of these charges is a considerable amount, and a high yield per acre tends to lower cost of production by dividing such fixed charge over a larger number of units of production.

2. *The Law of Increasing and Diminishing Productivity.*

This is one of the most important aspects of the problem of crop-production. It has been established by various carefully conducted field experiments, and it may be illustrated by the accompanying table showing the results of tests at the famous Rothamsted Experiment Station.

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In this case the supply of nitrogen was the variable factor of production. Similar results have been obtained when other factors such as phosphates, water-supply, &c., have been variable. One's reason points to the conclusion that it would be possible to continue adding labour to a given amount of land until the labourers get in each other's way.

as possible per acre. The principle underlying this statement applies absolutely only when the labour and/or material needed for maximum production are of no value for other purposes.

A similar mistake is involved in the view that the objective should be to obtain the maximum production per unit of labour. Such an objective may be

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—	Plot 5.	Plot 6.	Plot 7.	Plot 8.
Nitrogen supplied (pounds per acre) ..	0	43	86	129
Total produce (straw and grain) (pounds per acre)	2,315	3,948	5,833	7,005
Increase for each 43 lb. of nitrogen ..	..	1,653	1,885	1,172

The law of increasing and decreasing productivity has been stated as follows: *As increasing quantities of any factor of production are added there may be an increase in the return per added unit, until a maximum is reached, after which the return per added unit is likely to decline.*

The law points strongly to the probability that general validity does not attach to the somewhat plausible statement that farmers should produce as much

sound when the use of other factors of production, including land, is obtainable free and labour alone has to be paid for.

3. *The Chain of Factors that Determine the Production of Crops is as Strong only as its Weakest Link.*

The following principle of crop production is probably the one most frequently violated in practice.

The chain of factors is an extensive one, but for convenience of consideration the factors may be grouped roughly under the following heads: Adequate cultivation, adequate supplies of plant-food materials, suitable seed, and doing work at the correct time. If there is default in regard to any one factor, then, according to the degree of default, attention resulting in the complete fulfilment of needs in regard to all other factors will be nullified. An unfortunately common and at the same time simple illustration of this is moisture-supply of the soil; if all other factors of production are fitted to give a 60 ton an acre crop, and the moisture-supply of the soil is fitted to give only a 30 ton an acre crop, then the 30 ton crop is secured.

The position which is the basis of this law may be expressed otherwise thus: There must be balance in cropping-work; if there is not balance, then expenditure and labour both are likely to be more or less futile according to the extent to which proper balance is disturbed. For instance, money spent on good seeds and adequate supplies of suitable fertilizer will be wasted to some extent at least if cultivation is neglected.

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BESIDES providing grazing for early-calving cows, winter spelling of a few fields is a splendid insurance against feed-flavour and bloat. The premium is really in the form of a bonus—increased profit to the farmer who is progressive enough to take out the policy. But winter spelling must be done in a certain way or it will not be profitable.

Winter spelling of a pasture does not pay when it simply is winter spelling—that is, when a pasture is closed in the autumn or early winter and not grazed until the spring. The nutritional value of herbage saved in this way is very low; the undergrowth partially decomposes—the cows dislike it, and, when forced to eat it, give a musty-flavoured cream. Furthermore, the clover suffers from prolonged smother by the grasses.

Profitable Winter Spelling.

If you must winter spell—and no dairy-farmer can afford not to winter spell—carry out the method backed by experimental evidence of success in the Ruakura grazing trials, Ruakura Farm of Instruction, Hamilton. Instead of complete winter spelling, graze leniently throughout the winter and early spring. By lenient grazing I mean rapid grazing from about 8 in. to about 3 in. and then spelling again to the next 8 in. stage.

There are two reasons for spelling to about 8 in. and no longer. The first is to spell for as long as possible between grazings without unduly damaging the herbage for milk-production and without unduly weakening the clovers which are essential for the well-being of the grasses. The longer the spelling the more are the grasses strengthened, and the more are the clovers weakened. To spell to a greater height than 8 in. is wasteful from a nutritional point of view and also results in partial decomposition of the undergrowth and undue smother to the clovers. Spelling to a lesser height does not give the best results in changed species-composition of production, and that is one of the reasons for winter spelling—namely, to make a clovery pasture grassy for the spring. The other reason for spelling to about 8 in. is to allow the herbage to "harden off" and so reduce the likelihood of feed-flavour.

Fig. 1.—Side view of pasture consisting mainly of fog, rye-grass, cocksfoot, and white clover.

Fig. 2.—Top view of turf in Fig. 1.

The idea of grazing to about 3 in. only is to bring about a rapid recovery of the whole plant, roots as well as leaves, and to refresh the smothered clover with light and room without unnecessary injury by more severe defoliation.

Result of Correct Winter Spelling.

First, you actually get more herbage for grazing from a system of long spells between lenient grazings than from close and continuous grazing. Secondly, you get good grazing out of season. And, thirdly, by winter spelling you can deliberately change a clovery pasture into a grassy pasture in one winter. There are times when you simply cannot get high-grade milk and cream from young pasture herbage because it is too succulent and too clovery. Those are the times when you feel the pressing need for older herbage which has hardened off and is also more grassy. This grassy 8 in. stage of growth will also save you from losing valuable cows from bloat. But you cannot get it at a moment's notice. You want it for the spring. To have it then, you have to make your arrangements in the autumn and winter.

Theory of Winter Spelling.

At Jeallot's Hill, England, Martin Jones has shown that pasture plants tend to maintain a balance between their roots and their leaves. Of course, no other concept is tenable, for root and leaf are almost completely interdependent.

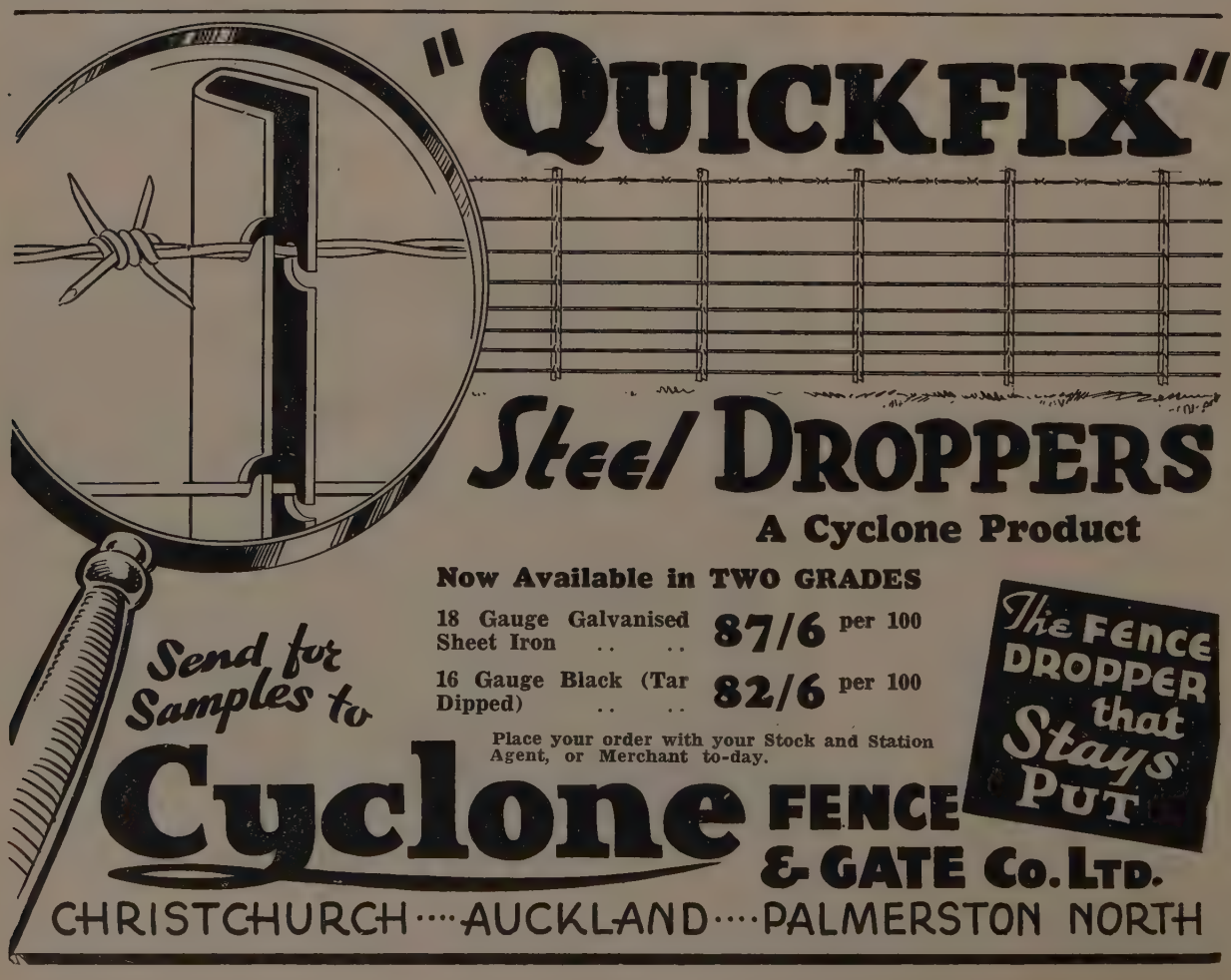
Now, the first roots and shoots of a germinating seed arise from the stored nutrients in the seed itself. When all these foodstuffs have been used, the formation of more roots and leaves *must* be brought about by roots and leaves already formed, co-operatively changing raw food-materials taken from the soil and air into plant tissue. As a safeguard against premature mortality which would otherwise occur after complete defoliation, the plant stores up nutrients in its roots and in the base of the leaves. From this material, and without the aid of any leaves, the plant can form fresh leafage with which to carry on normal "active" growth. The formation of new leaves without the assistance of other leaves, which is necessary in "active" growth, is called "transference" growth.

"Transference" Growth.

An example of "transference" growth is that pale-green leafage which soon appears on the stubble of a freshly-cut hay or silage crop, and another example is the "bite" or "picking" which occurs on very hard-grazed pastures even in the depth of winter.

Transference growth weakens the plant, and if the complete defoliation or almost complete defoliation necessitating transference growth were repeated continuously, without allowing the plant time to make sufficient leafage to replace the stores used up, a time must come when all the stores in the roots and shoots will have been used. The plant must then die.

This principle is applied in the attempted control of Californian thistle by constant mowing. It fails when the thistle is allowed to make sufficient leafage to replace the stores in the root. And there is scarcely need to point out that, commensurate with the frequency of complete or almost defoliation, the plant is to that extent weakened.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Hence, by close and continuous grazing in the winter and early spring, rye-grass, the most productive of the species in mixed pastures of dairy-farms during that period, is seriously weakened. Following this, in the late spring, when white clover commences rapid active growth, conditions are ideal for this clover to gain dominance if the hard grazing be discontinued. The competition of the grasses, and particularly of rye-grass, is meagre, and there is plenty of light and room to spread for the light-demanding, prostrate-growing white clover. And so, wherever there is sufficient of adequately-nourished white clover in a pasture, it is correct to say that close and continuous grazing in the winter and early spring weakens the grasses, particularly rye-grass, preselecting for the late spring and summer, clover dominance in production.

Preselection of grass dominance for the spring, although the converse of what I have just explained in grazing management and in results, is not exactly the converse in what happens. Jacques, of Massey College, Palmerston North, has shown that reduction of roots as a direct result of even one defoliation of a pasture plant is measureable. This suggests that the smallest defoliation causes measureable loss of roots, and the larger the defoliation the larger will be the loss. It seems reasonable to conclude that the more infrequent are the defoliations and the more lenient each is over a long period, the less will be the reduction of roots at each defoliation. Further, the less complete is the defoliation, the less will be the necessity for the plant to weaken itself by transference growth.

All this means that by lenient grazing (*i.e.*, rapid grazing from about 8 in. to about 3 in. and then spelling again to the next 8 in. stage) throughout the winter and early spring the grasses, especially rye-grass, are strengthened. Clover, chiefly white clover, are weakened by smother from the upright-growing grasses, and when the urge comes to what remains of the clovers to commence rapid, active growth they meet with very strong competition from the grasses, getting little light or room to spread.

Two Necessary Features of Winter Spelling.

Only by closing fields while the grass is still growing (April to May) will the grass continue to grow to any extent during the winter. Only by feeding out hay and silage before it actually becomes necessary is it possible to close fields while the grass is still growing. In the first year (1937) of the Ruakura grazing trials the winter-spelled area was first closed on 19th April. After eighty-five days' spelling (13th July), the growth had reached about 8 in. It was grazed to 3 in. It was then spelled for twenty-nine days (19th August), when it was again about 8 in. high. It was then grazed to 3 in. and spelled for nineteen days (20th September). Again it was grazed from 8 in. to 3 in. The next spell was for eighteen days (12th October), when it was again grazed from 8 in. to 3 in.—that is to say, there were four grazings of from 8 in. to 3 in. between mid-April and mid-October, six months including the whole of winter. And this pasture was very average.

To feed out earlier than usual and to have less winter picking may mean that on some farms a little more hay and silage must be saved. On the high-producing farms less will be required because there will be more grass and earlier grass when winter spelling is done. But bigger reserves of winter fodder should be saved than are usually saved on the lower-producing farms, on other grounds than for winter spelling. Many farmers will probably find during this dry autumn and approaching winter that their ideas of what constitutes a good reserve of winter fodder require revision.

Two Warnings.

Besides making a pasture more grassy, this method of winter spelling alters a pasture in two other ways. One alteration it causes is to make the pasture more open. I should not advise farmers where ragwort is bad—for example, in the King-country—to winter spell. What they want is dense pastures to prevent ragwort-seed from germinating, or, at any rate, to make it difficult for the ragwort-seed. They can get the greatest density by close and continuous grazing in the winter and early spring. They, themselves, will have to decide if too much clover is a lesser evil than more ragwort.

Yorkshire Fog, being a splendid winter-growing grass, increases in winter-spelled pastures as does rye-grass. This is no fault of winter spelling; it is the aim of winter spelling. Nevertheless, it would be inadvisable to winter spell a pasture in which there is a great deal of Yorkshire Fog. Where there is only a little of Yorkshire Fog, a little more will not matter very much, but where there is already too much any more is definitely undesirable.

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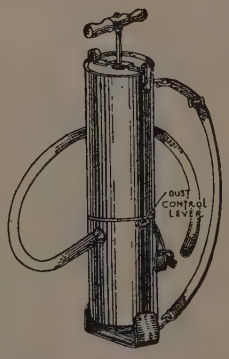

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Planting Farm Shelter in Northern Wairoa.

E. H. Arnold, Instructor in Agriculture, Fields Division.

In the northern Wairoa district the planting season for farm shelter commences during the autumn after the rains have sufficiently moistened the ground. The best results are obtained if the work is completed by the end of May or early June. If the soil lies wet during the winter spring planting is necessary, and this should be completed by early September to enable the plants to be well rooted before the dry weather.

The soils of the river-flats in this district range from peats to good river alluvial loams, and in some areas rather intractable clay silts are found. Careful preparation of the site of the future shelter-belt is necessary to obtain successful establishment. The best method, one that is seldom performed, is to plough and work up the proposed shelter-line. Excellent takes have been obtained by working up with the spade or mattock circular planting pits 18 in. to 2 ft. in diameter. Care must be taken not to set the plants out in a saucer-shaped hole, into which water drains from the adjacent unworked soil—a practice which causes many failures in the district. After rain has fallen the water lies in the depression, the roots rot, and the shelter-trees die.

Fencing is necessary for the successful establishment of most types of shelter-plants, and any expenditure on this should be looked upon as part of the cost of providing shelter and not as an extra expense to be avoided or reduced. Fences are frequently erected too close to shelter rows, and fail to protect the young trees from stock. The trees become stunted or grow unshapely.

Close-fencing Unwise.

Close-fencing of established belts, particularly of the taller-growing trees, leads to the lower branches being destroyed, for the stems become bare, and the upper portion then develops heavy and over-branched side growth. The open conditions at the base allow draughts to drive through, and stock are better out in the open than near such belts.

Shelter-belts have been established in the district for a sufficient period to decide which are the best kinds to grow. Many plantings have failed through attempts to grow the wrong variety or kind of tree. Again, lack of success has

Fig. 1.—A single row of macrocarpa at Ruawai, topped, but opening up at base of trees, which are set too far apart. The fence is also erected too close to the base of the trees.

Fig. 2.—A single row of macrocarpa at Mapau, Ruawai Flats. The trees are planted closer than those in Fig. 1. Topping has been done, but some side trimming would be well worth while. This belt is growing on the side of a wide drain, and as stock have not been able to damage the lower branches the bottom growth is still dense.

Fig. 3.—A single row of Bentham's cypress near Dargaville, topped at height of 10 ft. two years ago. The fence is rather close to the base of the trees.

been caused through poor planting methods and lack of attention after establishment. The following notes deal with those shelter-plants which have proved their usefulness on the northern Wairoa flats.

Cupressus Macrocarpa.

This vigorous and rapid grower has been more extensively planted on the flat than any other shelter-tree. Under poor conditions of management it has developed into large, rough shelter, covering a good deal of ground, but bare at the base where shelter is most needed. With adequate protection from stock, systematic topping and trimming of the sides, macrocarpa provides many miles of excellent farm shelter.

Where soil conditions are too wet for macrocarpa single plants die out, thus spoiling the whole shelter row. This tree, although used mostly as a single-row shelter, could be better utilized in mixed shelter-belts to act as the main breakwind if planted 6 ft. apart, either in single rows or in mixed belts. It is a valuable tree for planting in compact blocks for timber purposes.

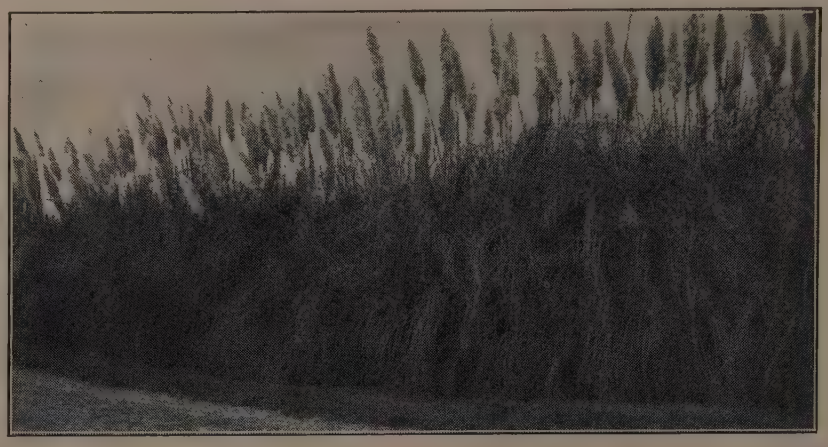

Fig. 6.—A shelter row of pampas-grass growing alongside a drain. It is the ideal shelter plant for the northern Wairoa flats, but requires protection from stock.

Fig. 4.—The western side of Bentham's cypress shown in Fig. 3. The protective row of pampas-grass now provides added density to the lower portion.

Fig. 5.—The same shelter-belt as shown in Fig. 4. Note the wind-blasted appearance of the Cupressus Benthamii where the pampas has not grown.

Cupressus Benthamii.

On soils which hold the moisture unduly or where the water-level is fairly close to the surface—conditions such as are found on many areas of these flats—this tree succeeds where macrocarpa does poorly. Although a certain amount of planting has been done its use is not fully appreciated. *Benthamii*, particularly during its early life, will not tolerate the salt-laden westerly winds ; if planted east and west only those few plants at the western end of the shelter row are affected.

A single row of pampas planted 6 ft. away on the west side of the proposed line of *Benthamii* proves beneficial. The pampas grows rapidly, affording protection to the young trees, and later provides the dense bottom shelter while the trees give the higher protection. In such cases the fence may be placed closer to the base of the *Benthamii*, and the overhanging branches provide a certain amount of shade for stock.

When *Benthamii* is planted in a single row fencing should be kept at least 6 ft. away from the base of the trees. Two-year-old trees spaced 6 ft. to 7 ft. apart give the best results for tall shelter, and they can be topped when they reach a height of 12 ft. to 15 ft. Cutting back every two or three years is then necessary.

Pampas-grass.

The second most popular shelter-plant grown is pampas-grass. During the flowering season in the autumn the lines of plumed pampas-grass give a picturesque note to many parts of the district. For dense low shelter up to 10 ft. high this plant is unsurpassed. Apart from maintaining adequate fencing at least 4 ft. to 5 ft. away from the base of the plants, no other attention is necessary. Trimming, the bugbear of hedges, is not required. When planted alongside the edge of a drain the roots assist in maintaining a firm bank. Sometimes the overhanging foliage reaches over the drain and shades the opposite bank, which is kept from crumbling during dry weather. In such cases the use of a sharp slasher is all that is necessary when the drain is cleaned.

During seasons when winter or early spring feed is short the fencing-wires may be removed temporarily and the stock allowed to graze on the pampas. By next winter the regrowth is sufficient to provide low shelter. Well-rooted sections of old plants or two-year-old seedlings, which can be obtained in many parts of the district, can be planted out 5 ft. to 6 ft. apart in single rows during August or early September. One-year-old seedlings, such as can be obtained from Whangarei, are best held in a nursery bed for twelve months. Put out about 12 in. apart, and then next season transplant in their permanent positions, making sure that a good ball of earth remains with the roots.

Where tall breakwinds are being planted pampas-grass proves valuable in providing the low, dense shelter so necessary when the taller-growing trees open up at the base. Pampas-grass planted out in the spring usually makes sufficient growth to protect young trees set out the following autumn.

Acacia Verticulata (Prickly Acacia).

Conditions are very favourable on the flats for this rapid-growing hedge plant, and many good hedges are to be found growing. Because of its prickly nature

Fig. 7.—Acacia verticulata growing at Mapau, Ruawai Flats. This hedge would be greatly improved by rough trimming back every second year.

Fig. 8.—New Zealand flax (Phormium tenax) growing on the Ruawai Flats. Clumps such as this are used on this property for shelter for sheep. Shelter-belts of this plant offer great possibilities.

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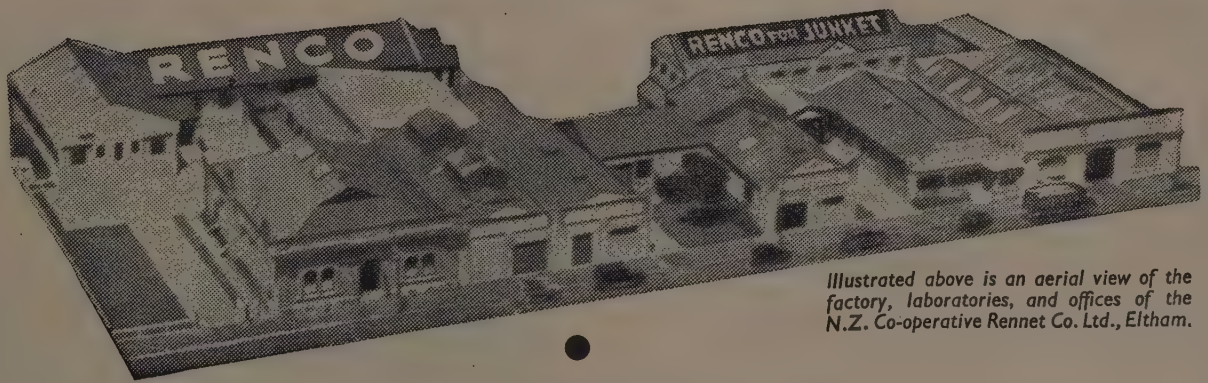

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it does not require fencing, except for a short period after planting. Good results are obtained by setting the plants out under the bottom wire of the fence-line. It does best if kept well trimmed after the second season's growth, but many good hedgerows are only roughly cut back every few years. Seed can be sown along a narrow strip of prepared ground in September or October. Plants, if used, should be set out 18 in. apart in a single row.

Phormium tenax (New Zealand Flax).

Conditions are very suitable for the growth of flax, and it is rather surprising that use of it has not been made in this district for shelter-belts. Short rows are to be found, however, and in one instance clumps have been left in a field when the land was sown down to grass. As previously recorded in the *Journal*, flax is popular in Southland, where the plants are cut for milling purposes.

During this autumn, belts are to be planted on the Northern Wairoa Demonstration and Experimental Farm. In time the rows will be cut for milling and valuable information will be available. Rooted fans from established plants can be set out in May or early June in single or double rows 5 ft. to 6 ft. apart.

Fig. 9.—Pampas-grass grows quickly and provides excellent shelter-belts on the northern Wairoa clay flats.

Fig. 10.—Shelter-belt of Cupressus Benthamii. This tree makes rapid growth in clay soils and forms a dense shelter-belt when planted in double rows.

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Produce Good Litters.

D. G. BEATTIE and M. J. SCOTT.

THE ice gets thin when an attempt is made to tell the other fellow his business, and since the production of good litters is chiefly a matter of common-sense this article might seem rather unnecessary. It is mostly a repetition of what every sound producer now does, but there are always those who are making a start and a perusal of the following will at least provide them with something to discuss, refute, or try out, depending on their viewpoint.

On the whole the production of litters is on a fairly high level in New Zealand not so much because of the number of pigs reared per litter, but because of the high weaning-weights achieved. The 40 lb. weaner has been an ideal now for nearly ten years, and the average weaning-weight of 34 lb. to 35 lb. per piglet at eight weeks now attained is an improvement on the 26 lb. to 28 lb. of some years ago. There is, however, the same kind of loss from birth to three weeks, 20 per cent. to 30 per cent., in New Zealand as in every other country. This occurs, as a rule, during the first three days. Its elimination would enhance the profits of pig-keeping enormously. There is a further loss due to the low numbers of pigs sold per sow, due to having only one litter and to winter deaths. In 1927 there were only slightly more than five pigs slaughtered for every sow kept. In 1936 there were over nine being slaughtered. When twelve per sow can be slaughtered, the average attained in the Old Country will have been reached, and when fifteen per sow are slaughtered there will be no further need to talk about ways and means of producing good litters.

Give the Sow a Chance.

The preparations to be made for the production of a good crop of pigs begin with the mating of the sow.

One cannot expect to raise a big litter of pigs from an old or fat sow. How many sows are retained long after their productive value has fallen to zero, after their fifth and sixth litters? Granted there are exceptions, many sows still produce large-sized litters as far as numbers go, but how many of these sows actually rear to a finish the litter they gave birth to? On the other hand, underfed sows cannot produce big, strong, lusty pigs. Starvation is just as harmful as overfeeding. No one except the man on the job can say how much to feed to a sow. Success lies in keeping an eye on the sow's condition and studying her progress. It is important that the brood sow be in good condition when the breeding or mating season arrives. There are many, of course, who think differently, under the impression that a sow low in condition at the mating-period will yield a larger litter. Flushing of breeding-stock prior to mating is recognized as the first essential in securing good results. This flushing of the sow is performed spontaneously through the reabsorption into her system of her own milk at weaning-time, and because it happens accidentally its value is seldom appreciated by the owner, who starves her or leaves her without water until her milk goes off. Those who have failed to get their sows in pig just after weaning will probably appreciate the importance of flushing, and what a poor fist they have made of it without Nature's assistance.

Comfortable and Clean Pen.

Location of the sty plays an important part in the success or failure of a pig crop. Under all circumstances, adequate and clean housing is essential for the raising and production of good pigs. At least three weeks before farrowing the sow should be brought into the farrowing-pen to allow her the opportunity of becoming acquainted with her surroundings. Most of the dead pigs just after farrowing are because of disturbed sows. They have not settled down in their new surroundings and are irritated by them. The higher the condition of the sow the more easily she is disturbed. Changes from open air to the restriction of a pen; from drinking and eating when she likes to feeding occasionally and irregularly; inability to escape from irritating squeals next door, combined with the adjustments taking place internally, call for especial care on the part of the owner if the sow is going to settle down comfortably. More pigs would be saved by attention to these details than have ever been saved by farrowing-rails.

A wooden overlay on a well-sloped concrete floor ensures a clean house. If pens are in continuous use it pays to sterilize them before each new sow is put in. Three or four buckets of boiling water containing disinfectant scrubbed over the walls and floor reduces the incidence of infection, especially of scour and worms, in the young pigs. Clean troughs and a wholesome feed-supply is just as important for baby pigs as they are for calves, lambs, foals, or puppies, and pay just as good dividends with pigs as they do for other young stock.

Nurse Sow after Farrowing.

Opinions vary as to the best ration to feed the sow after farrowing. Some give no feed for the first day, providing water only, others continue with the usual ration as given prior to farrowing. Some feed a liberal ration of bran as a slop. Sows will not, as a rule, eat too much bran, and it satisfies their appetities. As a laxative it will rapidly reduce the feverish condition of the sow, as well as reducing the dangers of constipation. Other successful pig-men use molasses regularly with equally good results. Regularity of quantity and quality of feed-supply and times of feeding are most important. The matter of exercise for the sow is also one of importance and should not be overlooked. If good, clean pasture is provided the matter of exercise naturally finds its own solution.

Feeding the Litter.

The value of getting the litter to commence feeding at as early an age as possible is worthy of consideration. They will, as a rule, make a start when about three weeks old. A creep should be constructed in a corner of the pen or run occupied by the sow, to provide the piglets with a high protein-growing ration such as meat-meal in addition to the mother's milk. In this way, ultimately, milk can be fed directly to the young pigs without upsetting their digestion. Crushed or rolled oats at this stage are the best of the cereals. Healthy, robust piglets go for rolled oats with gusto, and they make good use of them.

Castrate Boars at Three Weeks.

Many pigs now rejected on account of faulty castration, scrotal abscess, and peritonitis would pass the Inspector if castration had been carried out when the pigs were younger. Young pigs are usually careful to keep themselves clean. They are not so active and prone to fight as older pigs. Small incisions can be made in the younger pigs. Young pigs are easier to handle than older ones. For these and a number of other reasons the

young pig heals up quicker and cleaner than the older pig, and as a result pigs castrated when quite young are seldom rejected or degraded for the reasons stated above. Postponing the castration of boars to weaning-time has nothing to recommend it.

Commonsense in performing the operation pays good dividends. Make the incisions at the bottom of the scrotum so as to let the wound drain, and scrape the cords outwards instead of in towards the body in order to carry any infection away with the testicle instead of leaving it on the scraped cord that is retained in the body. Use disinfectant liberally and at the strength recommended by the makers; and also use it for your own hands prior to the operation as well as on the wound itself.

Dairy-farmers and Sheep.

H. A. BAYLEY, Inspector of Stock, Whangarei

IT is becoming a common practice for dairy-farmers to buy sheep or lambs as a side-line to graze some portion of their farms not suitable to dairying. Some of these farmers do not appreciate the fact that in owning sheep they bring certain responsibilities upon themselves.

A very essential requirement is dipping. It does not appear to be very well known that all longwool and crossbred sheep in the North Island must be dipped between the 1st January and the 31st March in each year. In the South Island this period is extended until 30th April. Application can be made by any owner for an extension of time, and, where circumstances warrant, a further period, not exceeding thirty-one days, may be granted in writing by the Inspector of Stock for the district.

For all sheep not dipped a penalty is provided of not less than 3d. and not more than 2s. for every sheep not dipped. Where lice-infected sheep are found in any place at which sheep are offered for sale, a penalty not exceeding £10 is provided.

Many buyers are under the impression that all sheep, before being yarded for sale, have been previously dipped and no further treatment needed. This is not always correct, and the onus is on the buyer to find out the position.

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Factors in Successful Farming.

(5) Factors in Farm Development.

W. H. Paton, Senior Investigational Officer, Accounts Division.

WHATEVER the walk of life, man continually aspires to bigger and better things, and farming is no exception to the rule. Thus extension and intensification figure large in the aspirations of existing or intending farmers. Extension may be attained either by acquiring an addition to the area of the farm or by breaking in an undeveloped portion. Scope for intensification lies in the direction of raising productivity by better management and efficiency and by exploitation of by-products and side lines. The bulk of these measures entail capital and labour, and hence in envisioning future expansion it is essential to have proper regard for this fact.

As pointed out in the second article of this series, an undeveloped area within a farm may prove a liability rather than an asset unless the reserve of capital and/or amount of full-time family male labour available is sufficient for the purpose of the proposition concerned. Scope in farm development and incidental costs and labour are not at all easily gauged to any close degree of accuracy. In consequence the path of development is one of many vicissitudes arising often from defective purchasing, planning, and management. Man's optimism towards husbandry possibilities is ever apparent and must surely be inherent. Place him on a plot of ground, and in a very short space of time his mind is away in a garden of dreams. No doubt it would be a sorry state of affairs if we did not respond so readily in this way to Nature. But in a practical world we need to be practical and guard against this susceptibility to optimism.

Extension.

The points of importance to be considered where extension of a farming enterprise is brought about by the purchase of an additional area corresponds closely with what was dealt with in articles two and three. Therefore it remains to discuss the case where an undeveloped portion of a farm is to be broken in. This is one of the commonest forms of development and expansion in farming, especially where the shortcomings of the class of farming concerned, of the locality, and of the management ability of the farmer are such as to considerably limit intensification. Typical cases of unproductive land are timbered areas; land covered in scrub, fern, gorse, &c.; swamp; pumice land; sand waste; gum land, &c. The examples given well illustrate the range of distinctly different propositions that may be involved. Hence remarks can only be of a general nature and having a bearing on the broader aspects more or less common to each instance.

Once satisfied that improvement of the area in question is feasible and that the work can be done in reasonable time either in stages or as a whole, it is necessary to be assured at the outset that the proposition is economically sound. One important aspect is whether or not the area, once improved, can be kept in production without unduly high maintenance-cost. In this connection the case of thousands of acres in the middle districts of the North Island may be quoted where over-steep bush-land should never have been cleared at all.

Development-costs.

Go carefully into the development-costs, making allowance for possible contingencies, and also endeavour to assess at a reasonably conservative figure what extra production is likely to result and at what maintenance-cost. Much depends on individual circumstances. More than one course of action may be feasible, and any alternatives should be carefully gone into in order that the best development plan may be adopted. Do not overlook the possibilities of indirect products arising out of the development-work, such as posts, droppers, firewood from a timbered area. The stones removed from a stony piece of ground can often be put to profitable use as fences, in filling in culverts, in metalling yards or roads within the farm, in the laying of foundations for concrete work, or in the building of dams, &c. The spoil from cutting drains can occasionally be employed in building stop-banks, or for fillings, &c. Tea-tree scrub is useful for shelter purposes when interlaced in wire fences.

Where the amount of work to be done is appreciable, it will be found in all probability that the usual farm labour is insufficient for rapid progress. Considerable capital outlay may also be involved. It should also be borne in mind that while the unimproved portion lies idle interest on its unimproved value has to be earned by the remainder of the farm, unless the purchase price was sufficiently favourable to offset this aspect. Land lying undeveloped too long often becomes infested with noxious weeds to such extent as to menace the improved portion of the farm and render maintenance of the latter unduly high in consequence. Eradication or control of noxious weeds on unimproved land in the rough often can prove an arduous and expensive undertaking. Hence it is to the farmer's advantage to break in the areas as rapidly as possible.

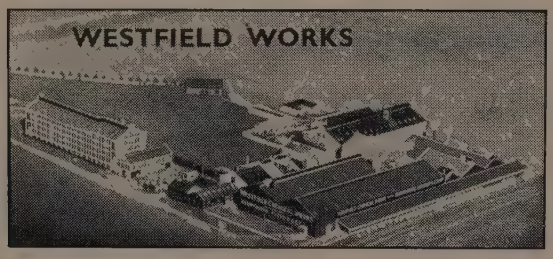
Contract System.

In these days of smaller families and movement of young people to vocations other than farming, the breaking-in of a considerable area of unproductive land may represent a difficult problem unless enough capital is available to have the work done by contract. Much of the drudgery of land-improvement can now be obviated by the use of specialized mechanical equipment which, although beyond the pocket of the average farmer, is available through contractors. The saving of time possible by the employment of modern methods is a major consideration. The first expense may appear high, but against this savings should be taken into account.

It is sound practice not to go in for a farm where heavy land-improvement work is necessary without having on hand a reserve of capital for the purpose. Those who have not made special capital provision for pressingly essential improvement work, and whose availability of family labour is not great enough, should endeavour to raise the finance to have the work done by contract. Should this not be feasible, it may be best to dispose of the area where opportunity offers, especially where it is proving an encumbrance.

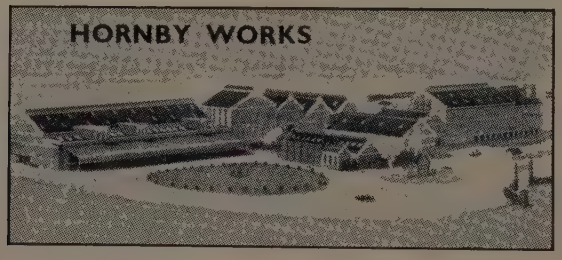
In breaking in unproductive land there are two main divisions of work to be done. The first of these is of an agricultural-engineering nature, and the second the preparation of the ground for crops or pasture. Unless the farmer has reason to be confident in his ability, kn wledge, and experience, it is wise to consult the Instructor in Agriculture for the district

forging ahead!



IN THE NORTH ISLAND

"WESTFIELD" BRAND



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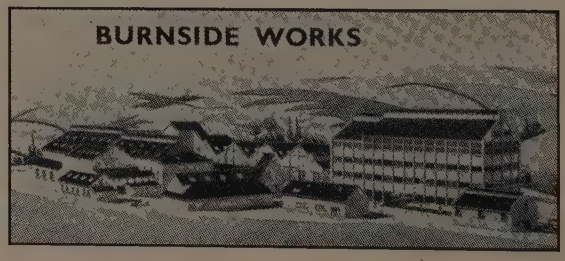

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before any plan is completed and proceeded with, particularly should the soil be of a poor type requiring considerable building up or physical improvement.

Where the bulk of the work is to be performed by regular farm labour, it is necessary to see that the amount of work and programme to be followed do not clash with the maintenance and working of the remainder of the farm. If too great a task is undertaken, in the aggregate some portion of it is likely to suffer in consequence. Often many of the consequences which mitigate progress arise from sources external or internal to the farm that can in part be anticipated beforehand, and those that cannot be reasonably anticipated can be provided for by the margins contained within the plan or through its flexibility. Therefore very careful planning is essential.

These points are of particular import to farmers financing improvement partly or wholly from farm income. This is often a hazardous procedure, although it has to be admitted that by far the larger portion of farm-development work is carried on in this way.

It is nothing short of amazing that so much good progress has been achieved purely on the basis of where there is a will there is a way, and says much for the industry and efficiency of the farming community. One man's failure and forced sale of a farm is often another's advantage, and therefore it is necessary to see that one is numbered in the right group. Regard must also be had for the repercussions of the bringing into production of a new area, such as increase then necessary in stock, chattels, and labour. This aspect is considered of such importance that the whole of the next article will be devoted to it.

Intensification.

As mentioned in the introduction to this article, intensification covers improvement of the productive portion of the farm and exploitation of by-products and side lines. Improvement of live-stock will be dealt with in articles eight and nine of this series. Improvement of land already productive provides an alternative or supplement to extension in the general aim of farm-improvement. Even under the more unyielding of conditions or under the higher levels of intensification and productivity, scope for improvement exists for those who fit themselves for the task.

As in the case of extension, intensification involves a good deal of capital and labour in its attainment. However, there is the redeeming feature that in the earlier stages these are not usually of considerable moment, and to those farmers who follow the practice of providing reserves from farm income for the purpose, and who draw up and carry out a carefully planned programme, the accomplishing of the later and more expensive stages of development should not prove difficult. Intensification entails such things as getting the soil into better heart and physical condition, by building it up with green manuring, the use of fertilizers, draining, fallowing, liming, cultivation, cropping, stocking treatment, &c.

In live-stock farming the aim is better pastures. Once the soil has been got into good heart and physical condition the laying-down of the best strains of grasses and clovers in providing a composition

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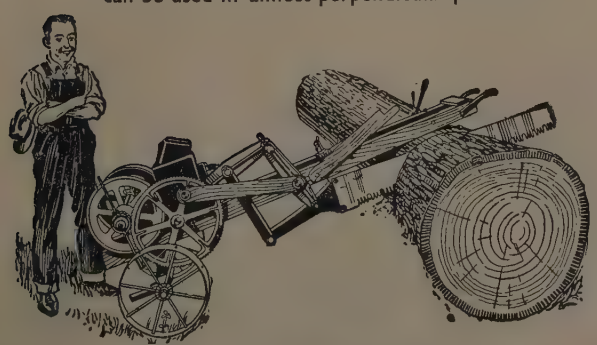

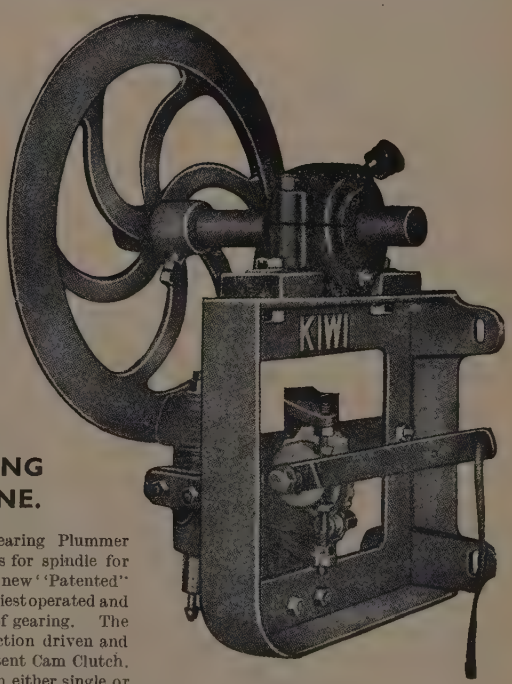

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and quality of sward suited to the conditions is considerably facilitated and enhanced, and likely to provide a pasture of really permanent and satisfactory type. The preparation of the land sometimes involves a certain amount of cleaning up of underground obstructions for deeper or more thorough tillage, eradication of noxious weeds, &c. Following the establishment of better pastures, provision for the heavier stocking possible, by addition of more subdivisional fencing, stock water-supply, shelter, buildings, plant, and equipment, &c., has to be made. The practical and various scientific aspects to all this work is the concern of the Instructors in Agriculture, and where information and guidance is required the officer for the district should be consulted.

Similar remarks apply to exploitation of by-products—*e.g.*, skim-milk by pigs—and side lines where specialist and instructional officers of the various Divisions of the Department may need to be consulted. The main points of importance to be borne in mind are not to attempt anything economically unsound, carefully to draw up and adhere to a progressive programme, and provide the capital essential to the success and rapidity of the improvement plan. Where available farm labour is scarce a certain amount of contract work may be necessary. The size of the stages of the improvement programme, and how these dovetail with labour utilization and other economic aspects, will be dealt with in : ext month's article.

Maintenance of Fertility.

One important aspect that should constantly be kept in mind, particularly in live-stock farming, is that production should be considered as conversion. In the exploitation chain, soil, pasture, live-stock, and live-stock products, together with the overriding factors of management and of weather and climate, &c., represent conversion from one stage to the next. As neither matter nor energy can be created or destroyed, input and output balance as between each stage. The bulk of the input originates from the soil, and some from the air, water, and energy sources such as sunlight, supplemented by man-introduced input in the form of fertilizer, lime, &c. The input supplied by man from external sources is intended to make up for original deficiency of the soil and for any losses represented in output—*i.e.*, products—carried away from the farm. This suffices in the maintenance of soil fertility and productivity at a given level, and thus, where improvement through intensification methods is involved, greater input is necessary before greater output can be obtained.

The Factor of Time.

The position is not quite so simple as so far explained, for the reason that the factor of time has to be reckoned with. Input from the soil to the pasture or other stock-food plants is derived from the soluble portion, which in the aggregate forms but a small proportion of the surface soil from which the roots draw their supplies. Action is going on in the soil continually through the effects of soil bacteria, water, air, heat and cold, &c., assisted by supplementary influences of man in the way of cultivation, liming, &c. This chemical and bacterial action fluctuates under the varying nature of the conditions giving rise to it, and also to man's interference. It can be readily appreciated how the factor of time enters into the picture, since action cannot be dissociated from time.

Therefore input of soluble matter from the soil, and of other matter from the air and energy from sunlight, &c., is governed by time. For different soils and for different conditions the quantity of each

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of the elements necessary for plant-life available in utilizable form per unit of time varies. As these available supplies are drawn upon by plants, more become available with the passage of time. The plant-food available to plants is dependent upon the nature of the source of the supply. Should the soil, for instance, be low in content of a certain element, there is danger of this being exhausted in the course of time, the length of time depending upon the rate at which the exhaustion process proceeds. Although a good supply of a certain element is available in the soil it may be in a form not readily rendered soluble by the agencies at work, or the latter may be less active for a number of reasons and be responsible for a similar result. Both of these conditions may be present, in which case the position would be accentuated.

Again, the soil may be entirely deficient of some element or elements of varying importance to plant (and animal) life. The level and rate of productivity is governed by the quantity of input in unit time of the necessary plant-food, not only as regards the whole but also as regards each of its components, according to their importance in plant nutrition. The position varies somewhat in character with the kind or class of plant concerned. Hence it is not only a matter that all the necessary elements be present in an available form, but also that the quantity of each rendered available by the agencies ht work keeps pace with demand, and eonsequently that the storage of each on aand does not become depleted through the rate of input lagging behind that of output.

Should the storage on hand become exhausted, then it is obvious that the rate of output is entirely dependent on the rate and fluctuations in the rate of input. Storage but serves as a buffer between the two in absorbing differences due to fluctuations in the rate of each. Input in terms of the action that goes on can be speeded up somewhat by man's interference and added input, but this needs to be very carefully done. With intensification methods man is but raising the performance of Nature to a higher level, which, as it is raised higher and higher, tends eventually to overreach the limiting factors that exist, and which are either not taken into account or are not practicable to offset. By concentrating on enhancing input of a particular plant-food which beforehand was considerably in short supply its quantitative availability in unit time can be so raised that eventually those of other necessary plant-foods may need raising also. In this way continued heavy top-dressing solely with phosphatic fertilizer may bring about a reversal of the original position.

Thus man can introduce unbalance and relative deficiency in input with high-level productivity methods, which did not exist at considerably lower levels. Man's knowledge and understanding of all these things is too imperfect as yet to allow of a more perfect and scientific interference. By altering the part he may unbalance the whole. Fortunately, this appears to be of no serious moment until higher levels are reached. It is therefore hoped that this rather imperfect picture of what is admittedly not a very easy matter on which to expound provides some indication of what has to be dealt with by farmers when intensification reaches high levels of productive exploitation. The problems are such as to call for intelligent understanding and handling.

Conclusion.

Provided good scope for intensification exists and management ability is in keeping with requirements, a deficiency of opportunities for extension is of little consequence. For those who lack possibilities in both directions there exists the consolation that it is always feasible under suitable guidance to improve management ability of live-stock as well as of land and pasture, and progress in farming science and practice is continually opening up further possibilities for improvement in all three to yet higher productive levels despite the operation of limiting conditions. There exists also the possibilities of greater exploitation of by-products and side lines. So let none be despondent for lack of opportunities.

Intensification methods in farming open up a vista of realizable attainment for man's aspirations of a satisfying nature second to none of any walk of life, and once the aspirant has experienced the thrill of a certain measure of success arising directly out of his own efforts he is made of very peculiar clay indeed if his enthusiasm is not fired with the desire for further efforts and success. There are those, of course, who have a preference for extension rather than intensification methods—for the staid rather than the colourful. But for those who are possessed of the zest of the explorer, the discoverer, and the scientist for that which is just beyond, there is no need to follow such paths when intensive farming is right to hand.

One needs to sound a note of warning, however, to those who may imagine that the intensive farming path is so well defined and easy to follow. It is but a mountain track winding and deviating from point to point, sometimes upwards and sometimes downwards, but leading eventually according to the climber's ability to higher and yet higher vantage points upon the slopes of an unconquerable peak towering above, towards which foothold becomes progressively more precarious, and where possible falls are fraught with graver and yet graver consequences. But what a challenge to skill and perseverance!

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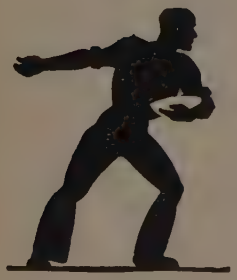

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Truck Farming at Pukekohe.

J. E. Bell, Instructor in Agriculture, Fields Division.

(Continued from April Issue.)

SOME Pukekohe farmers specialize in the growing of winter cabbages, which are marketed from May to September. About 100 acres of cabbages are grown annually. The seed is sown in specially prepared beds from January to April in drills about ½ in. deep and about 2 in. wide, spaced about 1 ft. apart. The bed is lightly manured with bonedust, or no fertilizer is used. The seed is scattered along the drills by hand at the rate of about 2 oz. to 3 oz. to the chain length. Sometimes the seed is sown by means of a Planet Junior machine, but this does not give the required spacing the young plants require for vigorous and healthy growth.

Fig. 1.—A crop of pumpkins commencing rapid growth. In a few weeks the ground will be completely covered with a mass of foliage 2 ft. to 3 ft. high. A crop of onions in the background.

As soon as the plants appear they are intercultivated by hand-hoes and given waterings in the evenings if the weather is dry. They are also sprayed usually every alternate evening with Black Leaf 40 at about 4 teaspoons to the gallon to destroy insect pests such as the caterpillars of the white butterfly and diamond-back moth and aphids. These sprayings are very effective, and little trouble is experienced in keeping the plants perfectly free from damage. If damping-off occurs, the waterings are stopped and the plants are sprayed with lime sulphur. The trouble commences in patches and does not cause a great deal of damage, though the above treatment does not appear very effective.

Spacing of Plants.

Where the plants are sown by hand in wide drills the disease is less liable to occur, but if the plants are too widely spaced they form very short stalks and do not grow as vigorously when planted out. One pound of seed sown in the bed will provide sufficient plants for 2 acres of ground. The plants are dibbled out into the field as soon as possible after pulling. If the soil is dry, watering to strike the plants has to be carried out. Usually this is only necessary for the cabbages planted out early in the autumn. Except for some later planted out cabbages in low ridges, the transplants are planted on the flat.

The cabbages are planted about 18 in. apart in rows about 27 in. apart. A mixture usually consisting of super and blood and bone is sown at the rate of 12 cwt. to 16 cwt. per acre along the rows before planting. About 1 ton of lime per acre is often broadcasted before planting. The cabbages are hand-hoed and intercultivated, and finally slightly moulded up during growth. They require little attention, as growth is rapid and weeds are quickly subdued. Frequently sulphate of ammonia at 2 cwt. to 3 cwt. per acre is top-dressed along the rows before moulding-up. After planting-out, spraying to combat insect pests has to be carried out until May. The frequency of these sprayings is dependent on the prevalence of insects. Sprayings, then, consist of arsenate of lead 1 lb. to 50 gallons of water or a combination of arsenate of lead and Black Leaf 40. The produce is cut and marketed in washed fertilizer-sacks. A good crop will produce 400 sacks or 30 tons of cabbage per acre. The cabbages are sold all over the North Island, and realize an average of about 4s. per sack. A fungus disease for which there is no known remedy, *Mycosphaerella brassicicola*, locally called rust, causes a fair amount of damage to cabbages and cauliflowers. Grass-grubs have been known to destroy cabbages in the bed, but they are seldom seen in the Pukekohe soils. Club-root is only occasionally experienced in either cabbages or cauliflowers at Pukekohe.

Chief Variety grown.

The chief variety grown is Henderson's Succession, and the seed of this variety is obtained from California. A few acres of Savoy are also grown mainly for and because they are preferred on the Wellington market. They are really a better eating cabbage. The Enfield Market variety is grown to a very small extent because they do not carry well.

A selection of Henderson's Succession —Henderson's Succession Early Market— is growing in popularity. The seed is sown in January and the plants are usually ready for transplanting in six weeks and take six weeks in the field before cutting commences. It is a flat-topped, smooth-leaved cabbage, and grows almost as big as the Henderson's Succession main crop, which it is like in appearance. The main-crop selection is sown in February or March. Sown in February it takes eight weeks in the bed and is eight weeks in the field before cutting commences. Sown in March it takes four weeks

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longer in the bed and twice as long in the field before cutting commences. May-transplanted Henderson Succession cabbages are said to be liable to go to seed-head. Seed-sowing, therefore, is generally arranged to avoid transplanting during this period.

Savoy cabbages are round—more round in shape than Henderson's Succession and are round-topped. The leaf is very crinkly. It is more liable to leaf-rust than Henderson's Succession and is a somewhat higher yielder. The seed is usually sown in December and January, and is ten weeks in the bed before transplanting and ten weeks in the field before cutting. If sown late the Savoy cabbage will not head, as it will not grow well in cold weather.

The Enfield Market cabbage is as quick in maturing as Henderson's Succession Early Market, and can be grown successfully at any period of the year. It is a smooth-leaved, heart-shaped cabbage pointed at the top.

Cauliflowers.

Cauliflowers are grown in the same manner as cabbages. One pound of cauliflower seed will produce sufficient transplants for three acres. The variety grown at Pukekohe is Phenomenal—early, middle, and main-crop selections. This variety is supposed to be a cross between the cauliflower and the broccoli. The broccoli is not grown now.

The seed is sown in January and takes about eight to nine weeks in the bed before being transplanted. The crops take a long time to mature, and all the plants from one sowing ripen in a short period. The cauliflower must be harvested immediately it is ready and will not await the grower's convenience like the cabbage. Consequently harvesting has to be rushed, and slumping in market values often occurs. The cauliflower is cut with a few leaves for protection and is placed in washed fertilizer-sacks. It must be marketed quickly, for it soon loses its freshness. The Phenomenal early variety comes on the market in June and July and the main crop about August. A good crop of cauliflower will produce about three hundred sacks per acre. An average price received for cauliflowers is 6s. per sack.

Pumpkins.

Both early and late varieties of pumpkins are grown. Seed of the Red Warren pumpkin is frequently sown in September, often among the still-growing early-potato crops. A few seeds are placed in raised beds 3 yards apart, between every second and third row of the potatoes. September-sown seed produce pumpkins in December and January. The yield is about 8 tons per acre.

Fig. 2.—Green peas. Two crops of green peas at different stages of growth. The peas on the left are commencing to flower, while those on the right are at a younger stage.

The pumpkin is large in size and round and pink in colour. Late varieties of pumpkins of good-keeping quality such as Crown and Triumble are sown in October after the early-potato crop is dug. The seed is sown about 9 ft. apart each way with a little bonedust. The ground is kept cultivated until the vines completely cover it. The produce is harvested in the autumn and is placed in heaps in the fields at the headlands, and left there till the grower decides to market the crop, usually at some time in the winter, although properly stored in sheds they will last till the spring. The price of pumpkins depends mainly on the supply. Prices are lowest about February, being then about £5 per ton, but rise as supplies become scarcer, till in November and December they reach about £20 to £30 per ton. The pumpkin crop is easily grown, requires very little fertilizer, and with its huge mass of quickly-rotting vegetation possibly improves the soil. The yield of the late crops is similar to that of the early crops because, although the pumpkins are small, they are more numerous and more mature when harvested. The Triumble and Crown pumpkins are grey in colour with a hard skin and are practically all flesh. They contain few seeds and there is no hollow space in the centre. The Triumble is slightly the larger pumpkin and is somewhat triangular in shape. The Crown is smaller and round. The Triumble pumpkin is slightly the better keeper, but being larger is not so popular with the housewife.

The Carrot Crop.

A few acres of carrots are sown annually and, if prices are good, are marketed in Auckland for human consumption or horse fodder. If prices are low, they are fed to live-stock on the farm. The seed is sown from September to February for the production of carrots the year round. About 2 lb. to 4 lb. of seed are sown per acre about ½ in. deep by the Planet Junior machine in rows about 1 ft. apart. Carrots entail a considerable amount of hand-weeding in the early stages of growth. Little or no attempt is made to thin the crop, except possibly for the spring-sown crops. The spaces between the rows are easily kept clean by the wheel push-hoes. Yields of 30 tons to 40 tons per acre are secured. The crop seldom suffers from disease, but in some seasons in some fields aphis attack is severe. Also the maggot of the *Psila rosae* fly is increasing in prevalence and sometimes causes considerable damage to the crop, destroying young carrots and damaging the roots and retarding the growth of more mature carrots. The aphis can be easily destroyed by nicotine-sulphate sprayings, but the *Psila rosae* maggot is more difficult to kill. However, the attacks of these insects are uncommon and the crop is not of sufficient importance to warrant preventive measures.

The Green-pea Crop.

A few acres of peas for the late spring market are sown at Pukekohe about July. The chief variety grown is Greenfeast. The next in popularity is Stratagem. The seed is sown at the

rate of four bushels per acre in rows about 27 in. apart with a little bonedust. Up to harvesting-time the crop requires little attention, except for a little interculti-vation. No staking of the peas is attempted. The work of picking the green peas is costly and prevents the growing of a large acreage. The green-pea pods are marketed in sugar bags, chiefly in Auckland City.

Other vegetables are grown at Pukekohe for the market, but generally only in a small way, and seldom or never are whole fields of lettuce, parsnips, rhubarb, and other vegetables to be seen. The truck farmers of Pukekohe are about two-thirds Europeans, mostly of New Zealand birth, the remainder, with few exceptions, being of British descent. During the last ten years Hindus have gradually increased in numbers, and form now, with three or four Chinese, the remaining one-third of the truck farmers. These Asiatics lease land from the European owners from £6 to £10 per acre per annum. One Hindu has purchased land. The Chinese compete very little with the Europeans in the growing of potatoes and onions. They confine themselves mainly to the growing of various vegetables in small patches of ground. On the other hand, Hindus have proven themselves efficient growers of potatoes and onions, once they have learnt and copied the local methods.

The enormous amount of help required for the growing and harvesting of vege-table crops is performed mainly by Maoris and their families. A number of the Maoris are permanently employed, but at seasons, such as at the digging of the potatoes, there is an influx of Maoris to do the work. They work on contract in gangs, men and women, in charge of a responsible Maori man, who keeps tally of the work of each digger and makes arrangements for work and food. The grower usually supplies food for the gangs while digging is in progress and deducts the cost from the diggers' wages. The Maoris work both for European and Asiatic growers. Work done in the less busy season by the permanent employees is usually done by the day. The Maori labourer suits the Pukekohe grower very well, for there are rush periods and much of the labour is not required constantly.

Pukekohe Hill is remarkable in many ways. The intensity of the farming of this small hill can be measured by the value of its produce. Each year it must produce at least £100,000 worth of produce. To obtain this produce the growers have to work hard and efficiently. They have not been slow to adopt new methods of growing or of fertilizing their crops. They are not afraid to spend money in buying fertilizer. The keeness of the European grower is exemplified in the freedom of their potatoes from virus and other diseases and in the high yielding-power and quality of their onions, com-pared with other potato-growing or onion-growing districts in New Zealand.

(*Concluded.*)

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Cool Storage of Fruit.

A. Powell, Cool Storage Officer, Wellington.

RECENT developments in refrigeration have taken the form of suspending the coils from the ceiling instead of placing them along the walls. Former difficulties in obtaining uniform cooling and coping with the drip have now been overcome.

Some are delving into the principles of gas storage with a belief that the future of successful commercial fruit cool storage will be affected beneficially by the use of carbon dioxide, and a good deal has been done in this field of research that is encouraging. Again, the refrigeration methods used in many of our stores may be improved upon.

In later years direct expansion cooling has become increasingly popular because of the detrimental effect of absorbents such as calcium chloride and forced circulation on long-storage fruit. The wall coil, which also proved unsatisfactory because of the drip, accumulated frost and caused loss of cool-storage space. Moreover, the cooling effect of this coil is not everything to be desired. The placing of the coils on the ceiling gives perfect cooling, but the drip and the problem of obtaining uniform cooling if large sections are trayed were difficulties.

The interior of a cool store, showing the trays covering the cooling-circuit coils, which are suspended from the ceiling.

Full-length Coil Circuits.

These difficulties are overcome if the coil circuits are taken to the full length of the chamber and the bends constructed in such a way as to bring two pipes with 6 in. centres together in one tray. The trays should be not less than 9 in. apart. The photograph gives a clear picture of one circuit which has twelve pipes 60 ft. long, and there are six trays to this circuit, sloping to each end of the room from the centre. Three trays can be constructed from a 3 ft. sheet of 24 gauge galvanized iron. They are of shallow V type construction, turned on the edges for added strength.

The circuit may be defrosted in the usual way. Preference is generally given to putting the hot gas into the coil by closing the expansion valve and opening a valve to admit hot gas into the coil at this end, which bears the heaviest frost. The return valve, being almost closed, allows the accumulated liquour to expand slowly into the return line.

The frost in the tray is then removed by hot water delivered into the cooling-chamber by an arrangement of pipes coming through the ceiling vertically where the trays meet in the centre of the chamber and slope to each end. On a two-story building this hot water would be brought in from each end and drained to the centre of the room, and then carried off by trays arranged suitably for this purpose. The hot water is required to be 95° or more to defrost quickly and effectively. The cooling water may be obtained from the jacket of an internal-combustion engine. For cooling temperatures more than 34° hot water is not necessary, as the system will not frost up enough to interfere with its efficiency.

Hot Water for Defrosting.

The effectiveness of the system is increased when using lower temperatures if hot water is applied to the trays, as the defrosting may be done when the chamber is full without fear of damage to stored produce, adding to this benefit the increased gain in efficiency when using a clean coil.

When installing a system such as has been explained the following notes are helpful :—

(1) Coils to be at least 5 in. from the ceiling, hung below supporting piping by specially constructed brackets.

(2) Keep the trays 3 in. to 4 in. from the coils ; this will check condensation and aid circulation.

(3) Produce stored must be at least 8 in. below the bottom of the tray. This allows for more air space for the coil to work on and also effectively minimizes the danger of freezing on the top of the stack.

The system has proved its efficiency when cooling the heavy loads placed on a modern cool-storage plant by receiving large consignments of fruit for pre-cooling. In this case an increase of refrigeration may be effectively used in quickly reducing a cool-chamber in temperature if the cooling-coils and trays are free from frost accumulation.

The ideal height of the chamber for this system is about 10 ft. 6 in. The ventilation is vertical, and is provided for by marking the floors out and painting lines to represent the required amount. This method facilitates stacking, prevents mistakes, and provides a uniform amount of spacing throughout the cooling-chamber.

Automatic control, where possible, is ideal in using this system of coiling, as fluctuations are avoided. Brine circulation is most effective, and may be used with automatic control to cheapen running-cost.

White-butterfly Parasite.

SOME concern has been expressed this autumn that the parasite *Pteromalus*, introduced to combat the white butterfly, has been responsible for biting human beings and causing swellings and discomfort in the region of attack. Fears on this score are groundless, according to the following statement which has been issued by the Entomology Division of the Plant Research Bureau :—

" The white butterfly parasite does not come within the category of a blood-sucking insect. It has mandibulate mouth-parts which, by their flexible attachment to the head, are adapted for feeding on a liquid. A blood-sucking insect has the mouth-parts modified into elongated organs that can be driven through the skin. *Pteromalus* only uses its mandibles for chewing its way out of the pupal shell of the butterfly.

The parasite cannot bite anything as tough as the human skin. Also, it does not sting, for its ovipositor is used for egg-laying. The only members of the Hymenoptera that sting are the ants, wasps, and bees, and these do not require the ovipositor as an instrument for placing the egg in a suitable position for the development of the larva.

" There is no evidence that the insect attacks human beings in Europe, Britain, or America, where it has existed for many years.

" We do not know of an instance of where *Pteromalus* has been responsible for biting any person. None of the workers in this Division has received bites from it, even when allowed to crawl over the hands. When these parasites are being handled many of them would be in a very irritable state.

" As a suggestion, it is possibly a Dipterous insect inflicting the bites.

" It is generally recognized, however, that insects of other species, particularly sand-flies, which bear a certain general resemblance in the eyes of non-entomologists to the parasite of the white butterfly, can inflict stings and bites which may result in blood poisoning through injection into the human blood system of germs carried by the sand-flies or mosquitoes from some other source of infection."

Spartina grass is to be found growing quite vigorously where it has been established by a neighbouring farmer on the mud-flats of the Kaipara Harbour between Glorit and Kaukapakapa. Its growth is by far the best when planted on the softer mud areas. Where planted on the harder flats its growth is much slower. In the latter places it, however, is tending to build up to a height of about 6 in. a layer of soft mud and debris.

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Citrus Pests: (1) The Dicky Rice Weevil.

W. Cottier, Entomologist, Plant Diseases Division, Plant Research Bureau.

THIS dicky rice weevil is a recent addition to our list of insect pests of citrus. It was first recorded from New Zealand in the North Auckland district in March, 1935. The insect is a native of Australia where in addition to citrus it has been recorded from apple, peach, and various garden plants.

Appearance of Insect.

The adult weevil measures approximately 2½ mm. to 3 mm. in length and is brownish with greyish-white markings on the prothorax, wing covers, and legs (Fig. 1, No. 5). The front of the head is prolonged into a short snout (Fig. 1, No. 6). Males may be distinguished from females by the presence of a long, curved spine and a smaller spine on each of the two front legs (Fig. 1, Nos. 8 and 9).

According to Woodhill and Allman (1927) the eggs are dark amber in colour, ellipsoidal in shape, and 4 mm. long. The same authors state that the larvæ when full grown are whitish-coloured, legless grubs about 3 mm. long having a circle of distinct reddish-brown bristles on the upper surface of the last body segment. Pupæ are of the same colour and approximate size as larvæ, with legs, wing covers, eyes, and antennæ of the adult insect plainly visible.

Nature of Injury.

Adult weevils eat pieces out of the tender young foliage (Fig. 2), but a more serious habit is the feeding that takes place on the surface of the fruit, the skin being chewed to form a network of irregular furrows which later discolour and cause marked disfigurement (Fig. 3). It is reported that up to 70 per cent. of the fruit may be badly disfigured and growth may be retarded or arrested by the attacks on the foliage.

Life-history and Habits.

The life-cycle in New Zealand is not known except that there are adult

Fig. 1.—Life-history of the dicky rice weevil: (1) Larva of weevil; (2) spined process on tip of abdomen of larva; (3) tip of abdomen; (4) pupa; (5) dorsal view of perfect weevil; (6) side view of same; (7) eggs; (8) foreleg of female weevil; (9) foreleg of male weevil.

Fig. 2.—Citrus foliage injured by dicky rice weevil.

—After Woodhill and Allman.

forms present in August and also in the February–March period. In New South Wales, Australia, there are two generations per year, the beetles of the first generation emerging from the soil from August to October and the beetles of the second generation in the February–March period. It would therefore appear possible that there are also two generations per year in New Zealand. The adult weevils lay their eggs in the soil, and, according to Woodhill and Allman (*loc. cit.*), the eggs laid by the August–October generation hatch about twenty-eight days later. The larvæ feed on the roots of citrus, especially nursery plants, but have been reported from the roots of apples, peach, and various garden plants. The winter is probably passed in the larval or pupal stage.

The weevils have never been known to fly and are normally unable to gain access to a tree unless they can crawl on to it. Experiments in Australia are stated to have shown that they are able to crawl a distance of 40 ft. from tree to tree.

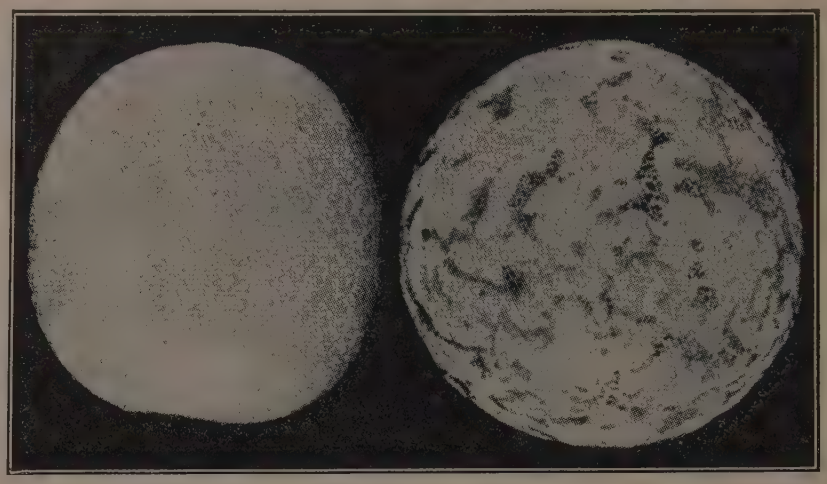

Fig. 3.—Sound fruit on left. Fruit injured by dicky rice weevil on right.
—After Woodhill and Allman.

Control.

In controlling this insect advantage is taken of the fact that the dicky rice weevil has never been known to fly, and control consists of banding the trees with a suitable tree-banding material. This is a thick "tacky" greaselike substance, usually vegetable in origin, which is applied in a band about 2 in. wide round the trunk of every tree at a point below the first branch. Bands should be $\frac{1}{16}$ in. to $\frac{1}{8}$ in. in thickness. If the material is to be used where the direct rays of the sun do not strike, it may be applied direct to the trunk. If, however, the band is to be exposed to the sun it is advisable to tie a piece of grease-proof paper very closely round the trunk and to apply the banding material to the paper. Where bands are applied direct to the trunk their positions up or down should be shifted from year to year to avoid possible bark injury. Bands should be freshened from time to time by rubbing or by applying more material. To prevent contamination by dust as far as possible bands should be placed as high up on the trunk as will allow them to carry out their function. Before banding is done the branches of the trees should be jarred sharply with a padded pole or other suitable means to dislodge any weevils that may be already on the tree. To prevent weevils gaining access to the tree through contact of twigs with the soil all foliage must be kept trimmed at least a foot from the ground. All weed growth round trees must be kept well down, otherwise these are likely to bridge the gap between ground and foliage.

Literature cited.

1927. Woodhill, A. R., and Allman, S. L.: "The Dicky Rice Weevil." *Agric. Gaz., N.S.W.*, 38, pt. 10 pp. 791–799.

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New Zealand Seed Trade.

N. R. FOY, Officer in Charge, Seed-testing Station, Palmerston North.

THE following table shows the distribution of the seed exported and imported, with total quantities and values compared with those of the previous year :—

New Zealand Seed Exported, 1937.

	Destination.					Total, 1937.		Total, 1936.	
	United Kingdom.	Canada.	U.S.A.	Australia.	Other.	Cwt.	£ (N.Z.)	Cwt.	£ (N.Z.)
Red clover	603	4,571	900	1,979	..	8,053	39,528	5,917	25,388
White clover—									
Certified	778	11	102	522	8	1,421	13,264	693	6,592
Uncertified	736	..	3	325	7	1,071	7,218	2,477	16,306
Other clovers	135	..	168	153	..	456	1,871	1,605	4,577
Brown-top—									
Certified	850	200	53	593	89	1,785	9,934	1,390	9,616
Uncertified	410	..	..	47	41	498	2,799	531	3,390
Chewings fescue	2,528	759	9,041	366	700	13,394	78,518	21,446	96,480
Cocksfoot—									
Certified	184	..	11	636	14	845	6,093	2,063	12,388
Uncertified	40	..	193	9	..	242	633	266	1,829
Crested dogstail	478	6	108	111	32	735	2,736	6,467	35,504
Perennial rye-grass—									
Certified	753	348	311	5,002	298	6,712	14,707	11,150	19,780
Uncertified	6,084	152	1,443	8,551	223	16,453	17,470	19,081	16,694
Rye-grass, other	67	26	326	3,946	204	4,569	6,232	5,185	5,278
Other grass	88	..	235	1,317	211	1,851	4,695	1,711	6,063
Totals—									
Hundredweight	13,734	6,073	12,894	23,557	1,827	58,085	..	79,982	..
£ (N.Z.)	..	..	..	..	..	..	205,698	..	259,885

Importation of Seed to New Zealand, 1937.

	Country of Origin.					Total, 1937.		Total, 1936.	
	United Kingdom.	Canada.	U.S.A.	Australia.	Other.	Cwt.	£ (N.Z.)	Cwt.	£ (N.Z.)
Red clover	..	..	20	..	257	277	1,276	75	185
White clover	..	..	..	..	4	4	51	..	..
Alsike	..	456	179	..	10	645	3,611	1,226	7,092
Subterranean clover	..	..	..	7,513	..	7,513	52,565	Inc. other clovers.	
Other clover	204	..	..	21	242	467	2,510	3,403	21,444
Cocksfoot	..	..	..	..	413	413	1,379	637	1,595
Lucerne	..	..	..	162	10	172	497	319	806
Paspalum	..	..	..	2,143	..	2,143	15,525	1,284	9,815
Rye-grass	3	..	..	25	80	108	289	27	56
Timothy	15	200	2,058	..	100	2,373	4,385	2,755	4,219
Other grass	29	..	843	4	337	1,213	5,816	963	3,525
Totals	251	656	3,100	9,868	1,453	15,328	87,904	10,689	48,737
Rape and kale	3,384	..	..	..	190	3,574	15,435	3,880	13,694
Turnip and swede	4,686	..	..	..	59	4,745	37,164	5,396	31,296
Totals	8,070	..	..	..	249	8,319	52,599	9,276	44,990

Points of Special Interest.

Red Clover.—The increase in the export of red clover is due to the North American purchase of 270 tons, compared with 50 tons for 1936. On the other hand, in 1936 Great Britain imported 110 tons of New Zealand seed, against 30 tons for last year. World prices for red clover are low, and it was fortunate for New Zealand that North American demand set in before the European harvest was available.

Present overseas prices make attractive buying for New Zealand and Australia, which is reflected in the slightly increased New Zealand importation up to December, 1937, and the reduced Australian purchase of New Zealand seed. Up to the present local stocks of New Zealand seed appear to be sufficient to meet a reduced domestic demand, due in part to the extensive use of subterranean clover in 1936.

White Clover.—The increase in the export of certified white clover, with a

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104 High Producing Butter-fat Cows.

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The foundation cows include such famous matrons of the breed as "**ANCERINE C.P.,**" C.O.R. 621 lb. fat; dam of "**HOLLYOAK ANNIE,**" V.H.C., C.O.R. 1,056 lb. fat; "**HOLLYOAK LAURETE,**" C.O.R. 596 lb. fat for 275 days at three years; "**EXILE KATIE,**" C.O.R. 614 lb. fat; "**LAMBERTS COUNTESS,**" C.O.R. 657 lb. fat; dam of "**HOLLYOAK COUNTESSA,**" C.O.R. 727 lb. fat as a junior two-year-old; "**BELMONT FLOWER,**" C.O.R. 613 lb. fat; "**TREASURES PATCH,**" C.O.R. 501 lb. fat as a junior two-year-old; "**OAKVALE FUSSY,**" C.O.R. 568 lb. fat; "**BOB TAIL,**" C.O.R. 524 lb. fat; "**HOLLYOAK LADY,**" C.O.R. 470 lb. fat as a junior two-year-old; "**GLENMORE VIOLET,**" C.O.R. 465 lb. fat as a junior two-year-old; &c., &c.

Only direct sons and near descendants of the high butterfat-producing cows "**HOLLYOAK ANNIE,**" V.H.C., C.O.R. 1,056 lb. fat, and "**LADY SUPERIOR,**" C.O.R. 997 lb. fat, have been used in building up this high-class stud.

Sires used include "**HOLLYOAK COMEDY-CHIEF**" by New Zealand's leading C.O.R. Sire "**GRANNIES KNIGHT,**" C.B.B. and from "**LADY SUPERIOR,**" C.O.R. 997 lb. fat; "**TE AUTE MARVEL,**" by the champion imported show bull "**SYBIL'S GAMBOGE DREADNOUGHT**"; and out of the famous show and high-producing cow "**HOLLYOAK ANNIE,**" V.H.C., C.O.R. 1,056 lb. fat.

The dispersal of this great stud gives breeders and dairymen an unprecedented opportunity of purchasing cattle to build up their studs, or a lifetime opportunity for intending breeders to found a stud on proved butterfat blood lines that have stood the test of time in the Jersey history of this country.

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corresponding reduction in uncertified seed, is most satisfactory. This can be accepted as a tribute to the excellence of the certified product, supported by a significant fall in price.

Brown-top.—Some years ago, when a duty of 40 cents was imposed by the United States of America, that country's annual importation was up to 100 tons, whereas of recent years it has been 2 tons to 3 tons only.

Chewings Fescue grown for export: The trade is dependent on the crop and quality of the seed.

Cocksfoot.—A most unfavourable season produced a low yield of poor-quality seed, at disproportionately high prices, which circumstances are reflected in a reduced export, and the importation of a small quantity of Danish seed.

Crested Dogstail.—Reduced export due to short New Zealand supplies and good Irish crops.

Perennial Rye-grass.—In view of the scarcity of high-grade certified seed, the export of 330 tons, although it represents a reduction of 200 tons, is very satisfactory. As in previous years, Australia was the principal buyer. Unfortunately, the 1938 season for perennial rye-grass is, if anything, slightly worse than 1937, and no great progress in the extension of our export is likely until a normal season is experienced.

Quality of Exports.

Great Britain and Australia still remain the largest buyers of uncertified rye-grass, which continues to be one of the largest items in the New Zealand seed export. There is a definite opinion that in view of the relative inferiority of much of this seed, and of the possibility of its unfavourable reflection on the quality of New Zealand perennial rye-grass as a whole, the export of uncertified seed from New Zealand should not be encouraged, or that it should be prohibited. It is true that some of the rye-grass seed shipped to Great Britain has been very unfavourably reported upon, and it is also true that the reputation of the superior New Zealand types has, on occasion, been used in the sale of uncertified, but taking the broad view one would say that, if New Zealand perennial has a place in Great Britain and Australia, a demand for this seed under seal will eventuate at the expense of inferior types of uncertified. Meantime, while there is a demand for New Zealand uncertified, we should take advantage of it, with the realization that with the rapid increase in perennial types in New Zealand the supply of inferior types should gradually decrease, and that given normal seasons certified seed will be available at prices more reasonable than they have been for the past two seasons.

Paspalum.—Following a bare market early in 1937, the quantity of paspalum imported is approaching a record.

Subterranean Clover.—The importation of 370 tons of subterranean clover is the most spectacular trade item for 1937, but in spite of fond hopes across the Tasman, for various reasons, it is unlikely that this performance will be repeated this year.

General.

In view of the most unfavourable harvest season experienced last year a total export of 2,900 tons of grass and clover seed valued at £206,000 may be considered very satisfactory, particularly when the total value is compared with that of some other industries which receive generous State assistance.

Fumigation Charge Reduced.

THE Stock (Agricultural Seeds) Amending Regulations 1938, which came into force on 1st May, 1938, reduce the fumigation charge on large consignments of agricultural seed imported into the Dominion from that portion of New South Wales outside the tick-quarantine area of that State from 1s. per package to 1s. per package for the first hundred packages and 6d. for each additional package in any consignment.

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WORLD FAMOUS REMEDIES

Farm Practice and Management.

Contributed by Officers of the Fields Division.

Winter Feeding of Young Stock.

On practically every dairy-farm a certain number of heifer calves are kept for future dairy-herd replacement. The same applies to sheep-farms, where ewe hoggets are often held, if not for breeding as two-tooth ewes, then for sale at that age when they generally command good prices. On small lamb-fattening farms breeding from two-tooth ewes is rarely undertaken, and the practice is to sell off all young sheep as lambs and buy older ewes as replacements in the flock. Young ewes seldom, if ever, give as high a percentage of lambs as older ewes, but nevertheless many farmers like to breed from their own two-tooths, and it is to this type of farm and to dairy-farms that this article refers.

In the case of heifer calves and ewe hoggets, and, in fact, of any class of young stock, their feeding in the winter months is of utmost importance, particularly so in their first winter. There is much in the saying that "good breeding must be combined with good feeding."

Supplementary Crops.

Supplementary crops for winter feeding should be designed to provide a healthy-growing ration rather than a fattening one—a ration that will keep the young stock vigorous at all stages of growth without encouraging the production of fat or an over-high condition. The main fodder crops supplementary to pasture are ensilage, hay, and roots, such as turnips, swedes, and mangels. Feeding should really commence before there is an actual want and before there is likely to be any loss in condition.

Hoggets are especially susceptible to setbacks by sudden change in feeding, and their management in the winter months calls for every care. Change must be gradual—that is, a gradual increase of the time spent on the new feed or an increase of the ration, as the case may be. Young cattle on dairy-farms are more or less used to home-paddock conditions, and their management is perhaps much easier. Still, if their ration is to include such feed as ensilage they should be started early enough to become used to it.

Where hoggets are fed on brakes of turnips or swedes a run off on to a good, clean grass paddock is desirable, and this will lessen the chances of parasitic infection. Hay should be provided in the run off. This is ideally fed in long wire-netting racks, which are easily constructed of sheep netting and ordinary fencing stakes. The length of the rack will depend on the number of sheep to be fed, and it can vary accordingly.

Wire-netting Racks.

Two stakes are driven in the ground at the required distance apart, and two widths of sheep netting are stretched between and tied to these stakes, with a clearance off the ground of about 6 in. The bottoms of the netting are then laced together and stakes in pairs driven at intervals on the outside of the netting at an angle of approximately 75° to the ground. The top of the netting is then stapled to the stakes, and the whole forms a long V-shaped rack ideal for feeding hay to sheep.

In the South Island chaff is often fed to hoggets as well as roots and hay, and this is rationed out in long troughs on the run-off paddock.

The winter feeding of young dairy cattle is similar to that of the cows, and the rations are carted and fed to the stock on the paddocks. Roots should not be fed alone; they are too cold and watery, and should be in combination with hay or a good pasture. A watery food should not be fed with one of a similar nature, such as roots fed with ensilage.

Whatever the feed or method of feeding growing animals in the lean times of the year, there should never be a want or a check or anything that is likely to have some reflection in the future life of the animals. Many of our stock diseases are no doubt due to malnutrition.

—J. M. Hopkins, Instructor in Agriculture, Taumarunui.

Movable Loading-ramp.

A VERY useful loading-ramp made from a pair of old cart wheels and axle is in use on the farm of Mr. A. T. Cooper, Eketahuna.

The outfit illustrated saves a great deal of time and trouble in the loading of pigs, lambs, and sheep, and has the advantage of being able to be moved to any required place, as compared with driving stock to a fixed ramp. This advantage has more than repaid the trouble and cost of construction.

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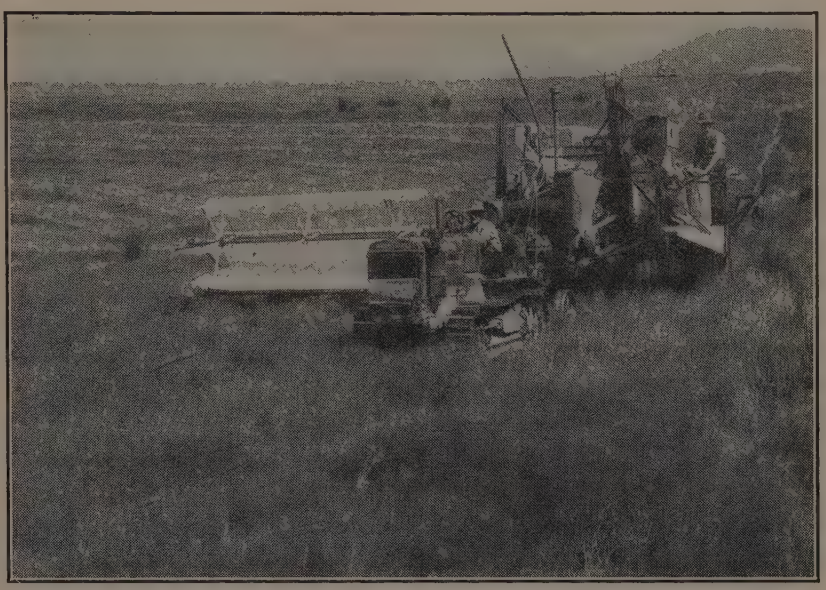
Harvesting Brown-top Seed.

EXCELLENT weather has been experienced this year for the harvesting of brown-top seed, and, while yields will be lower than usual, with a decrease in the acreage harvested because of the abnormally dry summer, the seed coming forward is nevertheless of good quality.

An innovation in the industry this year was the introduction of the header-harvester. The machine was operated in the Strath Taieri district, and proved itself capable of efficiently threshing the crop, both in standing position and out of the windrow. The only exception that could be taken to it was its tendency to shell the seed slightly, a defect that will undoubtedly be remedied as more experience with it in the handling of this fine-seed crop is obtained.

The outfit is operated by two men, and although unquestionably more costly to operate on an acreage basis than the horse-drawn stripping-machine—the more common method employed in the saving of brown-top seed—it enables harvesting to be carried out with greater despatch plus a higher return of seed than would be obtained with the stripper.

In operating costs, however, it should compare more than favourably with those involved when the crop is cut with the mower, raked into windrows, and later put in stacks for threshing, or taken direct from the windrow to mill by sweeps—systems that have their followers in southern districts, where brown-top grows luxuriantly.



An 8 ft. header-harvester threshing standing brown-top in the Strath Taieri district.

Heavy dews are often experienced during the period of the year when brown-top seed is saved, and, as these prevent an early morning start, travelling speed is an important factor because of the shortened day for harvesting. To obtain greater efficiency in travelling speed, the owner has arranged for pneumatic wheels to be fitted to the thresher, as they will allow the outfit to travel in top-gear without undue strain on the machine.

—J. O. Wallace, Instructor in Agriculture, Dunedin.

Retrieving Poor Hill Pastures.

MANY of the hill-country pastures of the Whakatane district—once consisting principally of rye-grass, cocksfoot, and white clover, and capable of supporting in a thriving condition up to two breeding-ewes and sometimes more per acre, in addition to cattle—are now, unfortunately, in the process of such rapid deterioration as to be but little better than matted swards of unthrifty brown-top and danthonia, with a carrying-capacity well below half of what it used to be during the years immediately following the initial bush burn.

White clover has long since disappeared from these pastures, and secondary growth, including bracken fern, hard fern, water-fern, manuka, and wineberry, is becoming increasingly more prevalent each year, thus further reducing the number of stock carried and adding measurably to the difficulties of general management.

Many factors are undoubtedly responsible for bringing about this unfortunate position, but of these there would seem to be three outstanding reasons—(1) soil-leaching caused by high rainfall in conjunction with a light porous soil of pumice origin, (2) constant grazing with no provision for the restoration of depleted plant-foods by the use of suitable artificial fertilizers, and (3) the carrying of too few cattle and too many sheep.

The latter cause in itself has resulted in an enormous amount of damage to hill pastures because of the killing-out of all the most valued grass species by the constant close grazing of sheep, and the shortage of cattle adequately to crush second growth.

Assistance of Top-dressing.

Top-dressing, however, is not a practicable proposition on much of this type of grassland because of the difficulties of spreading it and the high cost involved, but where the topography of the country and the locality lends itself, even with some difficulty, to the practice of top-dressing it is not too late to undo a great

deal of the harm that has resulted from past years of neglect in this respect. In evidence of this it can be stated that not a few farmers occupying hill country which, a few years ago, was considered either out of the question to manure on account of physical difficulties, or uneconomic to do so, are now top-dressing with wonderful results. White clover is coming back into the present poor pastures after the first top-dressing, and associated with this is a marked strengthening of grass-growth and a greater production of feed, enabling stock to be done better.

A practice that is undoubtedly facilitating the work of top-dressing hill country in this district is that of forming tracks to suitable points on the farm to which manure can either be packed or sledged or otherwise carted for later distribution by hand. One farmer is even contemplating the formation of a road sufficiently wide to enable a truck to travel along it, so pleased is he with his top-dressing experience to date. Other methods will, no doubt, present themselves to the mind of the practical farmer, and with them will come the realization that the top-dressing of deteriorated hill country, wherever at all possible, simply must be faced, and the sooner the problem is tackled the sooner his present hopeless state of affairs will be remedied.

Fertilizers Necessary.

Briefly, therefore, the question is not so much whether top-dressing can be afforded as whether a farmer can afford to do without it, and it is safe to say that no sound farmer will be willing to see the results of his life's endeavours slip through his fingers for the sake of a little extra work and money spent on suitable fertilizers. Wise expenditure on the top-dressing of easy country has always paid, and a similar experience will yet be enjoyed by the occupiers of hill country formerly regarded as unprofitable to manure.

In connection with the evil effects of soil leaching, little can be done apart from maintaining a good tight sward of grass which will encourage water to run off the surface into natural water-courses rather than to sink into the subsoil, taking with it large quantities of available plant-food. Here, again, the key to overcome the difficulty is sound grazing management, coupled with an adequate top-dressing programme.

—C. R. Taylor, Whakatane.

Good Crop Repays Thorough Cultivation.

BECAUSE of the dry season experienced in Otago, heavy crops of rape are not common even on the richest country; dry conditions and club-root have both been responsible for many poor crops.

The crop illustrated was grown by Mr. A. Thomson, of North Taieri, and is largely the result of very thorough cultivation and judicious manuring. The paddock in which the crop was grown was three-year-old lea, and in the beginning of August, before ploughing with a digger plough with skimmer attachment, three stack bottoms were spread over the land.

Between the end of August and the end of November the paddock was clod crushed once, double disked twice, and rolled three times. In the beginning of December it was top-dressed with reverted super at 5 cwt. per acre, and subsequently disked, harrowed, and clod crushed.

On 7th December broad leaf essex rape-seed was drilled in through every second coulter at the rate of 3½ lb. per acre, with 1 cwt. of reverted super. The paddock was rolled again two days later.

It will be seen that, including the top-dressing and sowing, the operations carried out for this crop numbered fourteen, the majority of which were concerned with the forming of a fine, deep, and well-consolidated seed-bed. That the result has been excellent can be judged from the accompanying photograph, which was taken prior to the crop being fed off and when the crop was about four feet in height.

—S. H. Saxby, Dunedin.

A good crop of rape grown in Otago, and resulting largely from thorough cultivation.

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WITH concrete floors, perfectly designed cow-bails, electric lighting, efficient milking-machines and separators, it would now appear that almost the ultimate stage of perfection has been reached in shed equipment. Yet even in many of the most up-to-date and lavishly equipped sheds the age-old pattern milking-stool remains to link the refinements of the present with the obsolete appliances of the past.

Regarded even from the most kindly and sentimental of attitudes, the shortcomings of the old-pattern milking-stool are obvious. It is always in the way, it is in contact with the floor—frequently upside down—and collects dirt as a dog collects fleas; it is difficult to clean, it requires constant handling, and is ever in need of repair or renewal. Its day is past; it is now a relic.

The pattern shown in the illustrations has been in use at the Ruakura Farm Training College for some years. As will be seen, it can be made very simply from a 5 ft. length of 6 in. by 2 in. timber. This is attached to a cross-bar in the dummy by means of a pivot operating in a longitudinal slot, the seat resting on a cross-bar in front of the dummy. It should be fixed at about 16 in. above the floor-level. The slot allows the seat to be pushed forward under the dummy when not in use, and to be adjusted sideways into the most convenient position when required for milking.

A very short experience with this modern stool will convince even the hardy type of farmer holding old-fashioned views—particularly if he himself has to milk—that there is something to be said for progress, and that even spectacular and expensive developments may be less appreciated than a minor improvement in some humble appliance which is in constant personal use.

—P. S. Syme, Ruakura Farm Training College.

Fig. 1.—The stool ready for use.

Fig. 2.—The stool stored away in forward position.

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Maize-seed Selection on the Farm.

ON the great majority of farms where maize-growing is practised the usual method of seed-selection consists of setting aside all the largest cobs when the grain is being shelled from the cob. These large cobs are subsequently shelled, and the grain is set aside for sowing the next crop.

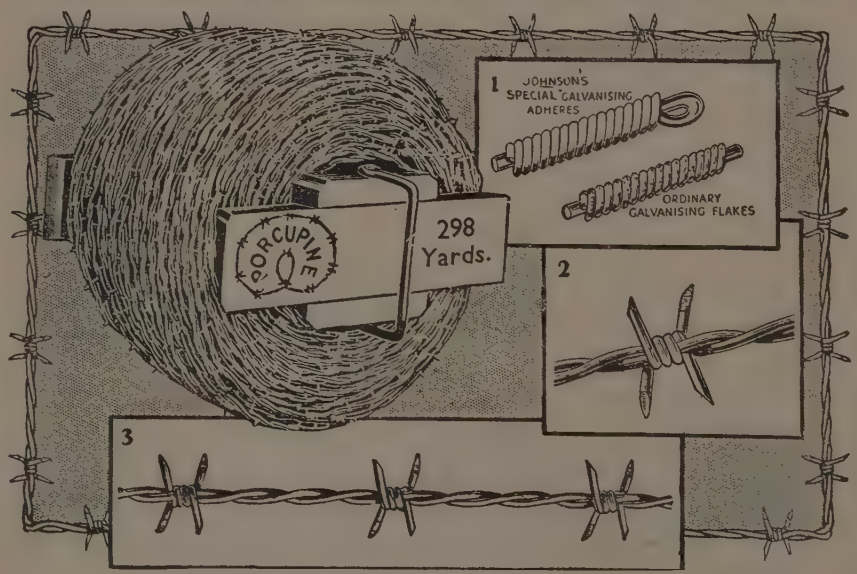
While this method may be better than no selection at all it has very definite weaknesses. With maize, as with any other crop, the outer rows, which receive the greatest amount of light and have a wider feeding range without fierce competition, will usually produce the largest cobs. Again, these large cobs may be badly placed on the stem, causing the plant to lodge even with light winds. Furthermore, the cob-covering may be insufficient to keep out moisture or ward off insect attacks. It may even lack that drooping habit just prior to ripening that is so desirable under wet seasonal conditions.

All these defects in the above system can be avoided by field selection just prior to harvesting. As only 12 lb. to 14 lb. of grain are required to sow an acre the

Fig. 1.—Samples picked at random of varieties at present under observation. Certain poor types are included.

[*H. Drake, photo.*

How JOHNSON'S BARB WIRE Stands the Strain of Years



PICTURE No. 1.

"PORCUPINE" Barb is specially galvanized. The illustration shows clearly the desirability of having Galvanized Wire which will not flake or peel.

PICTURE No. 2.

Shows the method of fixing the barbs on the main wires. Notice the well finished points and the security of the wrapping of the barbs.

PICTURE No. 3.

Shows the evenness of the stranding of the main wires, which ensures the fence taking the strain equally when erected.

The large illustration shows the completed reel of "PORCUPINE" Barb as it comes to you.

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gathering of this seed does not present any great difficulties.

The procedure is to go through the crop and select cobs from any part beyond the first five rows. The selected cobs, besides being as large as possible, should possess essential characteristics of the variety, such as grain-colour, grain-depth, cob-symmetry, &c., and should be well covered with husk. They should also droop as they near maturity in order to ensure good watershed in the next crop of cobs.

Cobs so selected may be expected to give a following crop fairly true to the selected type, whereas selection at the time of shelling might give any results, varying from fair to poor.

—*C. Walker, Tauranga.*

Fig. 2.—Students examining varieties for earliness of maturity.

[A. C. Poole, photo.

Maize as a Farm Crop.

A PROMINENT agricultural writer of the last century claimed that the ideal climate for maize provides also the perfect climate for peoples of the Temperate Zones. It has long been the proud boast of the New-Zealander that the climate enjoyed by his country is the finest on earth; yet the visitor may travel far, even in the Auckland Province, and at the end of his journey still exclaim at the sight of an acre or two of maize. That this was not always so is shown by Hochstetter's account of his tour in 1859, in which he comments on the extensive areas under this crop.

The reasons advanced to explain the comparative neglect of maize as a farm crop are many and varied, and are mainly founded on hearsay rather than on personal experience. In the northern part of the province it is claimed that most of the areas suitable for the crop are already under dense swards of paspalum, and that under such conditions maize cannot be grown profitably. A visit to the Northern Wairoa Demonstration Farm at Dargaville will quickly refute this contention.

Throughout the Waikato only very limited areas of maize are grown; the opinion is commonly expressed that it does not pay because the climate is too cold, or that the risk from early or late frosts is too great. That these statements are very far from being justified, however, is amply proved by the experiments conducted at the Ruakura Farm Training College during the past four years.

Profitable Yields.

During this period the weather has been variable; one good season has been offset by one bad season, and, in the aggregate, climatic conditions have been fairly representative of the normal for the district. Yet it should be noted that even in the worst year the yields were profitable, and this in spite of the fact that they had been obtained on a poor soil after a period of successive cropping and with only light applications of fertilizer. Full use, however, has been made of the cultivator and the hoe.

Yields obtained on Ruakura Demonstration Plots.

Season 1934–35.

	Bushels.
Ninety Day (shelled) ..	67
Hickory King	61
Average	64

Season 1935–36.

Early Morn	93·6
Rydes Excelsior ..	68·8
Golden Glow	62·8
Early Butler Cross ..	57·6
Early Butler	56·3
Otumoetai Horsetooth ..	55·0
Ninety Day	55·0
Hickory King	51·2
Average (shelled) ..	62·5

Season 1936–37.

	Bushels.
Early Butler (shelled) ..	70·5
Excelsior	63·5
Hickory King	62·0
Wellingrove	61·4
Keams Rough Dent ..	59·0
American Early ..	39·7
Average	56·9

The average yield obtained over the past three seasons is approximately 61 bushels of shelled maize per acre, and this includes a number of low-yielding varieties which are obviously unsuited for this district.

The following varieties are at present being tested over the 1937–38 season:—

American Early.	Keams Rough Dent.
Early Butler.	Wellingrove.
Funks Yellow Dent.	No. 350.
Golden Glow.	No. 450.
Iowa Silvermine	No. 525.
Otumoetai Horse-tooth.	No. 680.

All these varieties have been specially selected as likely to prove of value under local conditions. Some have been obtained from the East Coast and others have been imported from America and Australia.

More Experimental Work.

In view of the increasing appreciation of the value of home-grown maize as a supplementary food for the wintering of pigs, which is an economic necessity on the dairy-farm, the area devoted to

experimental work is being greatly increased. It is realized that one of the most useful and promising lines of investigation lies in carefully conducted variety trials carried out over a number of seasons. By this means it will be possible to determine the relative suitability for local conditions of a wide range of the varieties most successfully grown on the colder edges of the maize-belts in other countries, and to discover those varieties which best combine the desirable qualities of high production with earliness of maturity.

There is every certainty that, though many excellent varieties are already available, still better varieties will yet be found. Perfection may remain ever an ideal, but advance can result only from an effort towards its attainment.

—P. S. Syme, Instructor in Agriculture, Ruakura.

Cobalt Top-dressing for Bush Sickness.

THE practice of top-dressing with small quantities of cobalt as an addition to the ordinary top-dressing programme is becoming an increasingly popular one with many sheep-farmers located on certain of the pumice soils of the North Island that give rise to bush sickness (cobalt deficiency) in ruminant animals if preventive measures are not adopted. On this class of country—and there are millions of acres of it—in recent years much reliance has been placed by farmers in a limonite-salt lick, and, generally speaking, very excellent results have attended its use, especially by the dairy-farmer.

With the sheep-farmer, however, the practice had one serious drawback inasmuch as it was found utterly impossible to get *all* sheep to partake of a lick voluntarily. Hence the loss on a large flock could be quite considerable and, unfortunately, often meant the difference between profit and loss on the year's operations. To try and overcome this difficulty official experiments with cobalt top-dressing were conducted on a number of sheep-farms, and the results have been so promising that comparatively large quantities of cobaltized super have been prepared by certain superphosphate manufacturers to farmers' instructions for autumn top-dressing.

The amount of cobalt used per acre for this purpose is most generally within the vicinity of from 4 oz. to 5 oz., and for sheep this apparent trifling quantity appears to keep them perfectly healthy for at least twelve months. Dairy herds have not as yet been tried out on pastures top-dressed with cobalt, but it is a fairly safe prediction that, if sheep and lambs can be maintained in a thriving condition by the adoption of the practice, cattle will present no difficulty at all.

The above practice definitely ensures that *all* grazing animals get their share of the mineral matter that is vital to their health and general well being. It reduces labour problems incidental to hand treatment of animals to infinitesimal proportions, and, last but not least, the cost is trifling compared with other less efficient methods.

—C. R. Taylor, Whakatane.

News!

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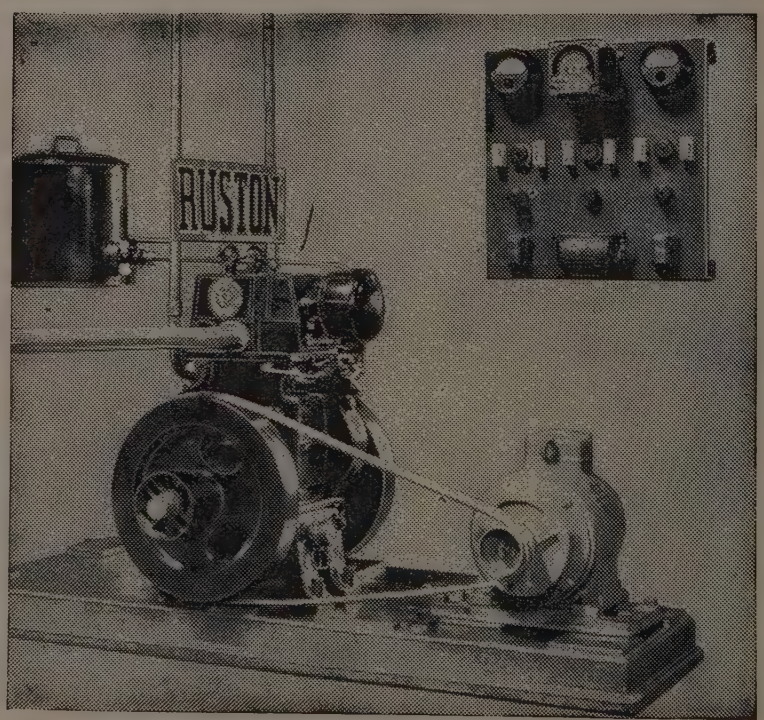

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Care of Farm Implements.

Fig. 1.—Valuable implement deteriorating in the field.

WITH the approach of winter, many cold and miserable days which may otherwise be spent on less productive work can be profitably used in overhauling farm machinery. With care and attention, implements have a long and useful life, and the maintenance is greatly reduced if the small repairs are regularly effected.

The provision of effective housing for all machinery is one of the first essentials for any farm. An implement-shed may seem expensive, but the ravages of the weather on implements standing in the open costs much more. If all implements are kept under cover you always know where they are when they are required, and a drop of oil or a little grease is all that is needed before a first-class implement goes out for a season's work.

In the field, all working parts need regular attention. All light, finely adjusted, fast moving parts need oiling at hourly or even shorter intervals, while the slower moving parts may only require lubrication once every four hours. Although most moving parts require oil, some unsealed bearings (block pulleys), working under sandy or dusty conditions, last longer without lubrication.

During use the most of the minor breakages occur, and as few farmers have duplicate implements temporary repairs are effected and the task finished. If these breakages were repaired, all would be well, but as the implement is workable no attempt is made to correct the fault, and the repairs are forgotten until a serious break occurs. The best plan is to check over a repair before the implement is stored; check over all bearings, tighten up all nuts and bolts, and replace all breakages. If this is done every time, there is no trouble when the machine is again required. The maintenance-costs are much lower, and when all minor breaks are repaired no opportunity is given for the breaks to place undue strain on other parts and cause serious damage.

Fig. 2 illustrates a good implement-shed which is very suitable for Waikato conditions. The first door from the left is the entrance to a wagon shed, and has an exit door on the far side of the building. The open door is the entrance of the implement-shed, and the smaller door on the right is the entrance to a manure store. The floor of the wagon and implement shed is of concrete, but the flooring of the manure store is of T. and G. matai, and is raised to facilitate loading of material on to wagons.

—W. T. Brown, Instructor in Agriculture, Hamilton.

Fig. 2.—A good implement-shed.

Germinating Capacity of Italian Rye-grass Seed.

THE seed of Italian rye-grass is usually very reliable as regards its germinating capacity. This year, however, it is mostly of inferior quality. Of twenty-six crops of Italian rye-grass harvested this season in Canterbury, not one showed a germination percentage over 90, and the average percentage was 69. The average figures for the Christchurch, Mid-Canterbury, and South Canterbury districts were 67, 76, and 66 respectively, showing that the trouble was widespread.

Several requests for an explanation of the cause of the trouble have been received. In reply it has been explained that the depression of the germinating capacity appears to be attributable in a great part to the unidentified fungal parasite more commonly associated with the seed of perennial rye-grass.

Italian rye-grass is generally much less susceptible to attack than is the perennial species, and this is the only season since the disease first came under observation that Italian rye-grass has been seriously affected.

Progress is being made in the investigation of the disease, and it is reasonable to hope that information with regard to the possibilities of effecting control will shortly be available.

—E. O. C. Hyde, Seed Analyst.

Clearing Stone from Volcanic Soils.

Fig. 1.—Natural covering of basaltic volcanic land, large boulders in foreground; a stone wall in middle distance built from boulders cleared from fertile brown loam in background.

LARGE areas of fertile, brown loams from volcanic (basaltic) origin are to be found in the North Auckland district. In their natural state (Fig. 1) they present a difficult problem to farm on account of the mass of heavy boulders which cover the surface soil.

In the early days the pioneer farmers soon realized that underneath the thick covering of boulders lay a fertile soil. They were faced with the huge task of clearing the boulders, and this job they tackled successfully. When clearing commenced the problem arose of how could the stone be disposed of; large heaps were made in the paddocks and a great deal was crushed for road metal, but the most useful and novel method of utilizing the boulders was to build them into stone walls. This method also made clearing easier, the boulders being sledged or drawn on a steel sheet and dropped along the line where the wall was to be erected.

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Stone walls make excellent fences which are definitely stock proof and have an exceedingly long life. Erection costs are heavy but maintenance costs are nil, and the walls also provide useful shelter from cold winds for dairy stock.

Thousands of acres have been cleared and the boulders used in this manner. The best dairy-farms in North Auckland are to be found on the fertile brown loams which in their natural state appeared impossible from an agricultural point of view.

Besides having a practical use, the stone walls on the volcanic farming areas throughout North Auckland present a picturesque sight characteristic of this part of New Zealand.

—E. B. Glanville, Instructor in Agriculture, Whangarei.

Fig. 2.—A dairy-farm on which all main subdivisions have been made by stone walls erected with boulders cleared off the property.

Management of Young Autumn-sown Pastures.

AUTUMN-SOWN pastures produce largely in the winter. The soil is loose, and on heavy soils is liable to be poached by stock. If the pasture is sown early in the autumn, grazing occurs early while the ground is still dry. The ground is thereby further consolidated before the soil is made wet by heavy winter rains. Therefore, poaching occurs to a less extent on pastures sown early and grazed early. Because of the liability to poaching, new pastures on heavy soils should be grazed only by light stock when the soil is wet, sheep or young cattle being employed. The grass should be grazed evenly to within about 1 in. of the ground during dry spells.

Never graze the young grass bare. Large numbers of stock are required so that the area can be grazed quickly, and the stock removed as soon as the field is grazed sufficiently. Before grazing again, the field should be spelled until the grass is about 4 in. high where cattle are employed, and 2 in. high where sheep only are grazed. In the early spring or in periods where patches of growth get away and are neglected by grazing-animals the mower should be employed to remove these. Never close up young grass for hay or ensilage. Before the ground becomes hard and dry at the approach of summer, and during the dry summer and autumn period, take particular care not to hard graze—always keeping a growth 1 in. to 2 in. high over the field to act as a mulch.

Most of the control measures employed for young grass aim at an early complete cover of white clover, so essential for the well-being of the pasture grasses. The young white-clover seedling is a delicate plant and will not stand shade or draught. The grazing management in the winter and spring aims at the prevention of shading, while that in the summer aims at the prevention of drying out of the soil.

—J. E. Bell, Instructor in Agriculture. Auckland.

Pressing Hay in the Field.

THE handling of large quantities of hay entails considerable labour and equipment if it is to be preserved in a condition which is palatable to stock. The best hay is that which, after laying in the swathe, is put into good-sized cocks and left to mature and is then finally stacked.

The cocking of hay prevents it from becoming weathered, and generally results in a first-class hay. The change of conditions has to a certain extent compelled the farmer to utilize methods which will decrease the handling of the crop, but which will also result in a hay of good quality.

Portable Pressing-machine.

The recent improved machines for hay-making have helped considerably to do this, and a suitable machine for the individual farmer is the portable hay-pressing machine. Mr. J. Kingan, " Black Cap," Kauru Hill, considers that the portable hay-presser is most suitable to the farmer who makes a point of conserving a good supply of hay for winter requirements. With the portable press he is able to handle the material at the right time. The pressing allows the material to be handled from the sweep to the presser, or the machine may travel along the swathe pressing the material as it goes.

The machine is fitted with a 2 horse-power engine. The number of men required to work it is three—one on the wire, one for forking, and one on the sweep. With this machine Mr. Kingan was able to press some 400-odd bales a day, and the total for the week was 2,255 bales. During this operation four hours were lost through wet weather. The petrol consumption was 1 gallon to a hundred bales. The hay should be turned before pressing.

The contractor's price is 10d. per bale. Therefore 2,255 bales would cost £93 19s. 2d. The machine costs £105 10s. One hundredweight of wire, which is sufficient for approximately 6 tons hay, costs £1 15s.

Method Worth While.

Labour-costs for men have not been considered. The costs given are sufficient to show that the method adopted is well worth while. By the time Mr. Kingan has completed his pressing the machine will have paid for itself in the present season and will always be there for other seasons.

For the farmer who requires five hundred to two thousand bales of hay the machine is a good investment. Mr. Kingan is satisfied that this method is efficient and that the baled hay is a tremendous advantage when feeding stock in the winter, as the material is easier to handle and there is much less waste.

—T. A. Sellwood, Instructor in Agriculture, Oamaru.

Winter Feeding Autumn Litters.

WITH the rapid decline of the skim-milk supply during April, May, and June there are many farmers who find they have late autumn litters which they cannot fatten profitably as pork. These pigs could, however, be fattened as baconers in the spring if they were maintained cheaply for about three to four months until skim-milk was again plentiful.

This can be accomplished if small areas of carrots, pumpkins, or roots are raised and fed in conjunction with small quantities of meat-meal, maize, or skim-milk. The use of these crops is perfectly satisfactory and gives a good return for the cultivation entailed in their production. Where failure has been reported it is due to the crops being fed without any concentrate, and where the young pigs have been badly treated from weaning onwards.

Feed for Young Pigs.

Young pigs should be well fed until they are about 60 lb. live-weight. Their feed can then be gradually changed to any of the crops mentioned above and the meals or skim-milk reduced. The minimum quantity of meat-meal to feed is ½ lb. per pig per day. Stores of 55 lb. fed ½ lb. of meat-meal and as many roots as they care to consume will grow at about ½ lb. per day. If the meal is increased to 1 lb. the rate of growth is increased to ½ lb. per day, and 1½ lb. of meal and roots will give a growth rate of ¾ lb.

Where maize can be grown it forms an excellent concentrate, and although deficient in protein it can be fed with good results in place of meat-meal, providing the pigs have access to clean paddocks. They are then able to make good the lack of protein in the maize and roots by the protein in grass.

Farm-grown root crops, such as pumpkins, are deficient in protein, they are bulky, they have a high water content, and they lack that high quality easily available protein and sugars present in concentrates and necessary to young growing animals.

The following table is a useful guide to the quantities of farm-grown crops that pigs of 55 lb. to 100 lb. live-weight will eat over a three-months period of feeding in conjunction with small quantities of concentrates.

Table of Root-consumption for Pigs 55 lb. to 100 lb. Live-weight.

Period (weeks) ..	1	2	3	4	5	6	7	8	9	10	11	12
Consumption per week (lb.) ..	60	70	77	84	90	98	105	112	118	124	128	130

Five years ago a farmer in Canterbury laid down a paddock with certified Hawke's Bay rye-grass. Three years later he laid down the neighbouring field with rye-grass which was claimed to be "of certified origin" but which had never been ticketed. Both paddocks were of similar soil type, had been treated similarly prior to sowing, and had been top-dressed with lime and super. When visited recently the first paddock had a splendid rye-white-clover sward producing excellent feed, while the latter had run out to hair-grass, danthonia, thistles, and flatweeds, only an isolated rye-grass plant being noted.

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Section for Irrigation Areas.

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Contour-race System.

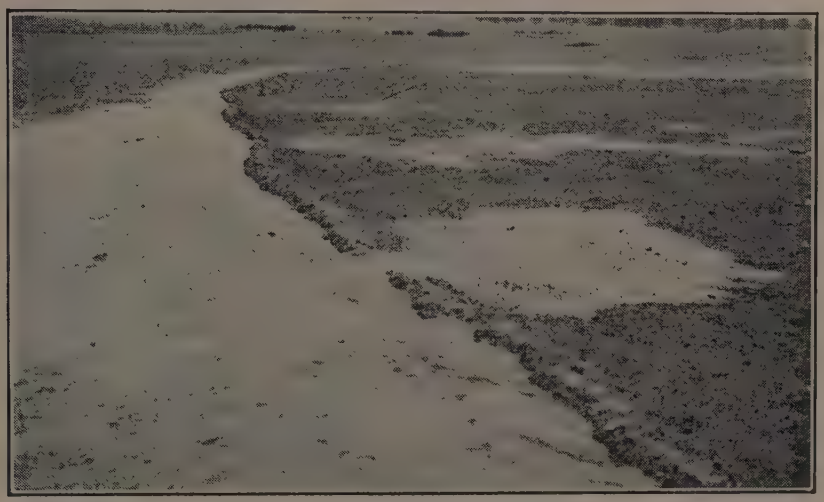

Fig. 1.—Illustration from Roxburgh of the method of irrigating from a contour race.

AS the name suggests, in the contour system of irrigation the water-race follows the contour of the land, and openings are made through which the water flows to irrigate the area. Fig. 1 illustrates the method being carried out at Roxburgh. If the slope to be irrigated is a long one there will be another race lower down, on the right of the photograph, which will collect the surplus water and redistribute it. Likewise further up the paddock, on the left of the photograph, is another race to irrigate the land between it and the case shown in the photograph.

Alsike for Surface Sowing.

On much of the irrigated grass land in Central Otago the present good swards have been produced by surface sowing the seed on land which has been harrowed or lightly cultivated only. Due to the rocky or shingly nature of the country or to the fall of some of the land, it does

Fig. 2.—Photograph taken at Cromwell illustrating the use of a canvas dam used to lift the level of the water in the race to divert it on to the land.

not lend itself to ploughing and subsequent cultivation. Also the consolidation of the soil required for the irrigation of slopes would be difficult to obtain by ploughing, and without this consolidation scouring would occur when water was applied. On many areas, composed originally of bare ground, scabweed, *poa maniototo*, and hair-grass, a stroke or two of the tine harrows or disks produced sufficient tilth, on which the seed mixture has been sown and then covered.

The seed mixtures sown materially varied, with rye-grass, white clover, and timothy or cocksfoot forming the base of the mixture. Alsike has been included, and under the conditions has proved to be a valuable species producing a large bulk of feed for the first season, producing a good cover to the land sheltering the slower growing more permanent species which will take up the running as the alsike thins out.

Class of Country.

Fig. 3 illustrates the class of country being regrassed under irrigation, the land in the foreground being typical of much of the unirrigated country in the district. The land in the background and to the right of the photo is being irrigated from a contour race and has a splendid growth of alsike in a mixture of rye-grass, white clover, timothy, cocksfoot, and dogstail.

Fig. 4 is a close up view of the irrigated pasture in the first photograph and shows the excellent growth produced from alsike. The remains of a plant of scabweed can also be seen.

The photographs were taken nine months after the area had been sown down on the property of Mr. H. Hesson, of Alexandra, who included in the grass-seed mixture 1½ lb. of alsike per acre.

—*G. G. Calder, Alexandra.*

Fig. 3.—The class of land being regrassed under irrigation. The land in the foreground is typical of much of the unirrigated country in Central Otago.

Fig. 4.—Irrigated pasture, showing excellent growth of alsike.

Structure of Pipeclay.

P. A. Gardiner (Tinwald) :—

Reference is made to subsoil of pipeclay in your Bulletin No. 84. What is this pipeclay? How can I tell it from ordinary clay?

Horticulture Division :—

Of fine texture and white colour, even the thinnest layer of "pipeclay" is impervious to water, and the soil above it is usually in an extreme condition of being water-logged with stagnant water or dried up and cracking. It forms a "pan" which prevents flood-waters sinking in during wet weather or the water in the subsoil rising to the surface in dry weather. It is occasionally found in the poorer hill country at the northern end of both islands.

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Horticultural Instruction.

Contributed by Officers of the Horticultural Division.

Pruning Operations in the Orchard.

WITH the advent of the winter season fruitgrowers will be considering pruning in order to complete the work while the trees are in a dormant state. A fairly early start is advised, as weather conditions cannot be relied upon at this season of the year, and often many growers have not completed pruning operations before growth commences in the spring. This means rushing the job through before the spraying season starts, with the result that the trees are, in many cases, improperly pruned.

The usual practice is to prune the different classes of fruit as they lose their foliage, and consequently stone-fruits are the first to be operated on. The work of pruning requires much skill and attention, and should not be hurried if the best results are to be obtained. A successful pruner should possess a good knowledge of the basic principles governing the development and maintenance of a healthy tree capable of producing good average growth every season, and of the necessary fruiting wood on which to carry an annual crop of high-class fruit.

No detailed system of pruning can be given which would be applicable to all districts and under all conditions, but providing the pruner keeps the main objects in view he will not go far wrong, and any other details to suit local conditions can be easily supplied.

Stone-fruits.

Peaches and Nectarines.

As the growth and fruiting habits of the peach and nectarine are similar the same style of pruning is applicable to both. These trees produce their fruit on the previous season's growth, and in order to obtain the maximum results a full supply of young wood and spurs on the lateral growth is essential. This can best be obtained by a judicious thinning out during the pruning season and by suppressing many of the stronger laterals entirely in order to induce further development of new growth in the following year. With regard to the shorter and weaker one-year-old laterals, the usual practice is to leave these entirely, unless too crowded, allowing them to fruit the following season, and then to remove them.

Peach and nectarine trees usually come into bearing at an early age. Therefore when training a newly planted tree the aim should be to provide it with strong leaders capable of producing good fruiting branches which, in turn, will be able to carry average crops of fruit for many years. The number of leaders required to form the tree depends largely on the type of soil in which the tree is planted. It should be remembered that, with the usual vigorous growth during the first few years and the heavy foliage produced, a tree with too many leaders is apt to become overcrowded and produce wood which is more or less sappy and immature, to the detriment of fruiting. Excessive growth also prevents the sun from penetrating to the inside of the tree, delaying maturity and the production of good-coloured fruit. Spraying operations are also handicapped.

Judicious Cutting.

The position of the chosen leaders should be maintained throughout the lifetime of the tree. This can best be done by judicious cutting every year, the length of cuts depending largely on the growth made during the previous summer. Some pruners are apt to be too severe on the leader-cutting, while others leave them uncut and shorten back all laterals appearing on the current season's leader growth.

Best results appear to be obtained by a medium cut of the leaders, the cutting-back or complete suppression of the competing heavy laterals, and the leaving intact of any small lateral growth for fruit-production the following year. By this means the tree will soon become furnished with healthy growth and fruiting-wood from top to bottom. On no account allow the top of the tree to become overcrowded with growth, or the laterals and fruiting wood in the lower parts of the tree will soon die out, leaving the bare limbs which are so conspicuous in some orchards.

Pruning for fruit in peaches and nectarines is a series of replacements, cutting out every season two-year laterals that have fruited and leaving the one-year-old laterals to carry on. These in turn will be cut away to make room for further short laterals. A number of spurs and laterals die every year. These should be removed, or bare branches will be the result.

Summarizing the foregoing advice, the main objects in successfully pruning a peach or nectarine tree are to build up a fairly open tree with a moderate number of leaders, to maintain good, average growth every season by judicious cutting of the leaders, to cut back or remove entirely laterals as they become unfruitful, and to maintain sufficient fruiting wood for the production of a good, average crop of well-coloured fruit.

Apricots.

Like the peach and nectarine, the apricot, if planted in a suitable soil and situation, is a strong grower during the first few years and until it has settled down to fruiting. For the first three or four years fairly heavy cutting should be given to ensure the development of a strong framework, after which pruning

can be considerably modified as far as leaders are concerned. Apricot trees, if well cared for, should come into bearing the fourth year after planting, the majority of the fruit being borne on short spurs which develop all along the main leaders and heavier laterals.

Long and heavy lateral growth should be shortened to within a few buds of the base every season. This will materially assist in the formation of fruit buds and spurs, upon which the best fruit is grown. Short laterals and fruit spurs need not be touched until after bearing, when they should be cut back to make room for a further supply of fruiting wood. As with the peach and nectarine, the pruning of the apricot, especially after reaching maturity, consists mainly of the removal and renewal of fruiting wood and the maintenance of sufficient vigour to produce crops of fruit.

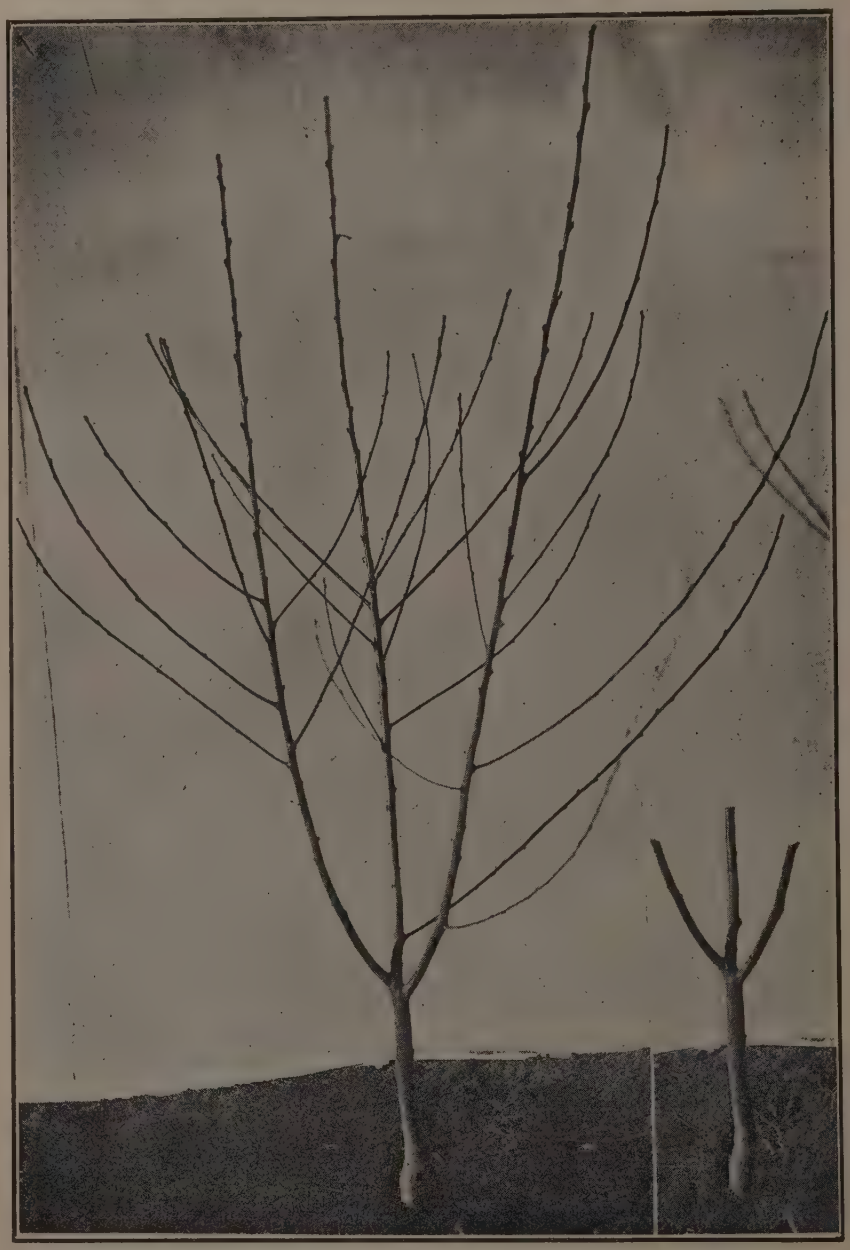
As the tree ages and bears heavy crops, top or leader growth will slacken off and in some cases cease altogether. It will then be necessary to prune heavier to encourage new growth, without which no fruiting laterals or spurs can be fully developed.

Cherries.

After the trees are formed and well established very little pruning is required in the average cherry-tree. Even with the formation of the tree it is not advisable to cut as hard as with other stone-fruits. The cherry-tree is very subject to "gumming," and heavy cutting accentuates the trouble. The majority of the fruit is carried on spurs from 1 in. to 3 in. long. These spurs are produced on two-, three-, and four-year-old wood, and will continue to develop almost to the ends of the branches. Unlike the spurs on the peach and nectarine, they are long-lived, and will continue to carry fruit for several years.

In the centre of the cluster of fruit spurs there is usually a wood spur, which, as it extends each season, will burst into blossom and carry a crop of fruit. The aim of the pruner should be to develop as many of these spurs as possible, allowing them to produce fruit until they become old and knotted, after which a judicious thinning out and renewal is advised. In fact, it always pays to treat a good number of these spurs every year, cutting out the older ones to make room for a new supply of young, fresh wood.

The cutting-out of any large limbs, cross branches, &c., should be done during the summer after the crop has been harvested. It is found that wounds heal more rapidly at this time, and there is also much less danger of "gumming." All wounds should be well covered with a coating of white-lead.



Peach, second year. A healthy, well-grown tree of ideal formation. This tree should be headed down as shown on right, the branches being reduced to 6 in.

Plums.

The majority of plum-trees, both European and Japanese, are strong growers when young. Consequently, after the tree has been shaped by fairly heavy cutting of the leaders it will not be necessary to cut so hard, more attention being given to the fruiting habits. On European plums the majority of the fruit is borne on laterals and spurs of two years and older, while on Japanese varieties the fruit is carried on spurs and laterals of the previous season as well as on older wood. Japanese plums are usually more prolific bearers than the European varieties.

The system of pruning consists mainly of the elimination of old worn-out laterals and spurs, replacing them with young fruiting wood. When pruning, not only should the clusters of spurs be well thinned out, but laterals not required for fruiting should be removed at the base. Laterals and spurs required for fruiting should not be touched until the next pruning season.

—George Stratford, Orchard Instructor, Motueka.

Citrus Culture.

GOOD drainage is essential to successful citrus culture and must therefore receive full consideration both in the establishment of new orchards and in the maintenance of existing ones. Insufficient drainage frequently results in the development of serious bark-diseases, such as collar-rot, bark-blotch, &c. Good drainage greatly assists in the improvement of the fertility of the soil, and most orchard areas are improved by additional drainage.

Drains should be large enough and have sufficient fall to carry away the water quickly when heavy rains are experienced, and should be about 3 ft. or more below the surface. For a few years after planting, citrus trees will, under certain conditions, make good growth where the winter water-level is about 2 ft. below the surface. This fact is liable to give growers a feeling of false security, for as the tree matures the roots penetrate to a greater depth, and consequently a lower water-level becomes essential for the maintenance of healthy trees.

Fig. 2.—A well-packed case of wrapped lemons.

Shelter.

Adequate shelter from all winds is probably more important with citrus than any other kind of fruit-trees grown commercially in New Zealand. Young trees checked in growth for several seasons by exposure to winds seldom make satisfactory growth afterwards. Consequently, in establishing a young orchard it is best to delay planting for one or two years rather than set out trees in exposed positions. Good, permanent shelter-belts around the boundary should be established at least two years before planting young orchards.

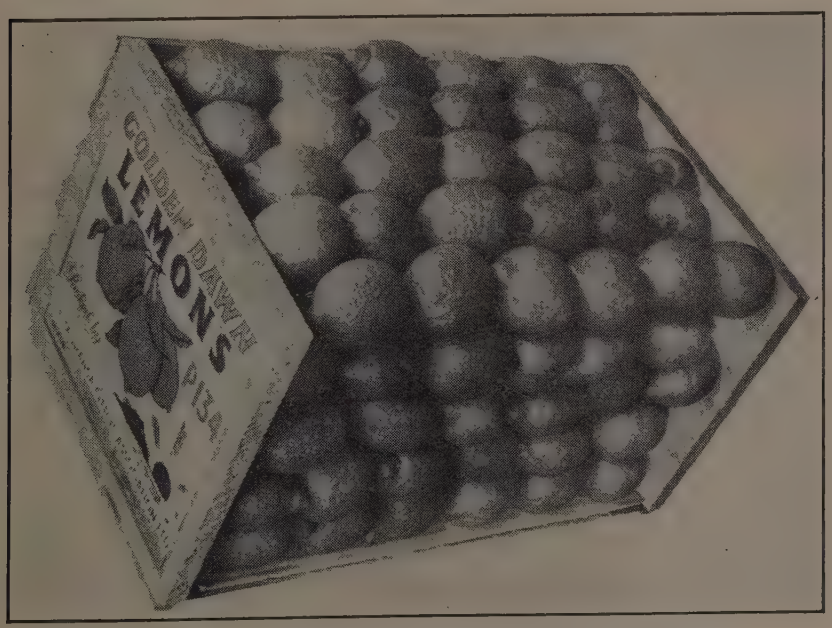


Fig. 1.—A well-packed case of unwrapped lemons.

Among the kind of trees that may be used for such shelter might be mentioned *Cupressus Lawsoniana, C. macrocarpa,* or *C. Benthamii, Pinus insignis, Eucalyptus amygdalina,* and Lombardy poplar. All these trees are not suitable for all conditions. For instance, in areas where a relatively heavy summer rainfall is experienced and drainage is bad *C. Lawsoniana* is not proving satisfactory; likewise, the Lombardy poplar is unsuited to well-drained, light, pumice soils.

In districts where *Hakea saligna* flourishes this tree provides an excellent shelter about 10 ft. to 15 ft. high and sometimes even higher. However, shelter of a greater height is usually desirable for mature trees. *Hakea saligna* is at times employed most successfully in combination with taller-growing trees, especially where the latter are inclined to become bare of foliage near ground level. The possible disadvantage of this tree is that it may prove to be a host for borers which attack citrus.

In cases where the permanent shelter has not yet reached sufficient height to provide adequate protection it is advisable to subdivide the orchard into smaller blocks by planting a quick-growing temporary shelter. For this purpose *Albizzia lophantha* is generally suitable, and has been known to grow to a height of more than 6 ft. from seed in the first

year. The seed should be sown ½ in. deep in the position where the trees are to grow.

For quick germination place the seed in a bucket and cover it with water which is boiling hot; leave the seed in the water for ten to twelve hours, and then pour the contents of the bucket into a fine-meshed riddle. Mix the seed with a little dry sand to separate it, and sow as soon as possible. The seed should not be allowed to dry after soaking.

Brown-rot.

Prevention is preferable to a hurried attempt to effect a cure when applied to citrus brown-rot (*Pythiacystis citrophthora*). Where Bordeaux mixture 3–4–50 has not recently been applied for this purpose the application should be made without further delay. Further remarks on the control of this disease appear in these notes for the previous month.

Fig. 3.—A side view of a case of properly packed wrapped lemons. Note the bulge at the top.

Packing.

In view of the recently introduced compulsory grading regulations it is expected that more than usual interest will be taken by growers in the art of packing. Lemons are packed in much the same manner as are apples, except that the 3–2, 7–6, five-layer pack (163) is replaced by the 3–3, 5–4, six-layer pack (162). The following packing chart will accommodate all sizes allowed to be marketed (other than to a factory) under the New-Zealand-grown Fruit Regulations 1938. Sizes which pack 252 to 319 inclusive may be sold only as "Small Grade."

Style of Pack (Crosswise).	Number in Rows (Lengthwise).	Number of Layers (Depth).	Size or Count.
3–2 ..	5–5	5	125
3–2 ..	6–5	5	138
3–2 ..	6–6	5	150
3–3 ..	5–4	6	162
3–3 ..	5–5	6	180
3–3 ..	6–5	6	198
3–3 ..	6–6	6	216
3–3 ..	7–6	6	234
3–3 ..	7–7	6	252
3–3 ..	8–7	6	270
3–3 ..	8–8	6	288
4–3 ..	6–6	7	294
4–3 ..	7–6	7	319

Sweet oranges are packed in the same manner as are apples. The method of packing New Zealand grapefruit differs from that used for other fruits in that it is usually packed on the flat. As this method gives different counts from those obtained in packing in the ordinary way a chart for use with the standard bushel case, for New Zealand grapefruit and marmalade oranges only, is given below:—

Style of Pack (Crosswise).	Number in Rows (Lengthwise).	Number of Layers (Depth).	Size or Count.	Approximate Diameter. (Inches.)
2–1 ..	3–3	5	45	4¼
2–2 ..	3–2	5	50	4⅛
2–2 ..	3–3	5	60	3¾
2–2 ..	4–3	5	70	3⅜
2–2 ..	4–4	5	80	3⅛
2–2 ..	5–4	5	90	3⅛
2–2 ..	5–5	5	100	3¼
3–3 ..	4–3	6	105	3¼
3–2 ..	4–4	6	120	3⅛
3–2 ..	5–4	6	135	3
3–2 ..	5–5	6	150	2⅞
3–2 ..	6–5	6	165	2⅝
3–2 ..	6–6	6	180	2⅝

—Percy Everett, Orchard Instructor, Gisborne.

Viticulture.

The Vinery.

IN vineries where late varieties are grown for the purpose of offering for sale, when the bulk of the outdoor-grown grapes are off the market, it is of considerable importance to keep the hanging ripe grapes in attractive marketable condition. To obtain this end the bunches should be shaded from strong light. Where the foliage is not thick enough, or where the leaves have fallen, brown paper shades can be placed over individual bunches, or the glass can be covered with whitewash. Ventilation should be given freely on hot, dry days, and under cold, damp conditions a little artificial heat should be supplied. Damping-down on fine, bright mornings to keep the berries from shrivelling is very seldom called for under the climatic conditions prevalent in New Zealand in autumn.

A decayed berry in a bunch is liable to spread its condition, and can easily ruin an otherwise fine specimen bunch, to avoid which frequent inspections are necessary.

Ripe bunches of grapes of some varieties such as the Black Hamburg and Golden Chasselas—the variety known in New Zealand as Albany Surprise is unsuitable—can be kept for a few months in cool storage under the same conditions as other fruit. Another method of keeping grapes is to cut them with a sufficient length of lateral to go into a wine or whisky bottle nearly full of water. A few pieces of charcoal are placed in the bottle to keep the water sweet. Care should be taken to avoid overfilling the bottles when drips of water from them might cause the bunches to rot. The bottles are placed on inclined shelves so that the bunches hang free from contact with the bottles or shelves. The ideal store is a dry, dark room or cupboard in which the damp can be overcome by heating or by placing a tin of freshly burnt lime in it.

The Vineyard.

The wine grapes having been turned into wine and the table grapes marketed, the next major operation will be pruning. In the meantime there are many jobs which can be carried out, such as digging out vines to be replaced, pruning surface roots off young vines, putting in posts for trellising after pruning.

Land now under grass intended for the planting of vines can be skim-ploughed as soon as it is in suitable condition and the sods allowed to rot on the surface to be followed in the early spring by a deep ploughing across in the direction of the skim furrows.

Cellar.

In the new wines a slow fermentation will continue in the dry wine for a month or two, and in the sweet wine much longer, the exact period depending principally on the amount of sugar present. Gas will be produced as long as fermentation continues, and might cause the container to burst if it is tightly bunged. A good plan is to cover the bung-hole with a small bag of clean sand laid over a vine-leaf. This will keep out the air and flies and at the same time allow the gas to escape. When used to cover the bung-holes of the barrels of fermenting dry wines or cider, these bags retain in the barrel some of the gas formed in the process of fermentation, and at the same time keep out the air, a condition unfavourable to the development of the dreaded vinegar bacteria. The barrel should be bunged tightly when the sizzling noise produced by the escaping gas-bubbles ceases. At this period, when the wine has become fairly clear, it should be racked or separated from the lees. This can be accomplished by inserting a wooden tap in the barrel above the lees or by siphoning the wine out with a rubber tube tied to a piece of cane so that the end of the tube will be a few inches from the end of the cane and above the lees in the container. Dry wine is usually racked after fermentation, and at the end of the winter, twice during the following twelve months, and once or twice in subsequent years, whenever possible choosing cold, bright weather to perform the operation. Sweet wine is racked twice the first year and once during subsequent years until it is quite clear and bright.

During the maturing-period of dry wines the barrels must be filled up regularly from small vessels kept for the purpose to replace the wine which evaporates through the wood. If an air-space is left mould is liable to form on the surface of the wine, and will probably cause the wine to turn sour. Air on the suface of sweet wines will not have the same consequence.

—J. C. Woodfin, Vine and Wine Instructor, Te Kauwhata.

Fig. 1.—An unpruned vine.

Fig. 2.—A spur-pruned vine.

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The effect of the size of the potato-seed on the size of top is clearly demonstrated at the potato-certification trials in Canterbury this year, tables having produced much bulkier tops than lower grades of the same line.

Experiments on Soya Bean.

EXPERIMENTS carried out on soya beans by Mr. A. F. Bell at Tahunanui, Nelson, have yielded some interesting results. He finds that rich soil is wasted on soya bean, and that a light, loamy soil suits it best. Sunshine, good drainage, and freedom from weeds are essentials. Undried seeds average 1,984 to the pound.

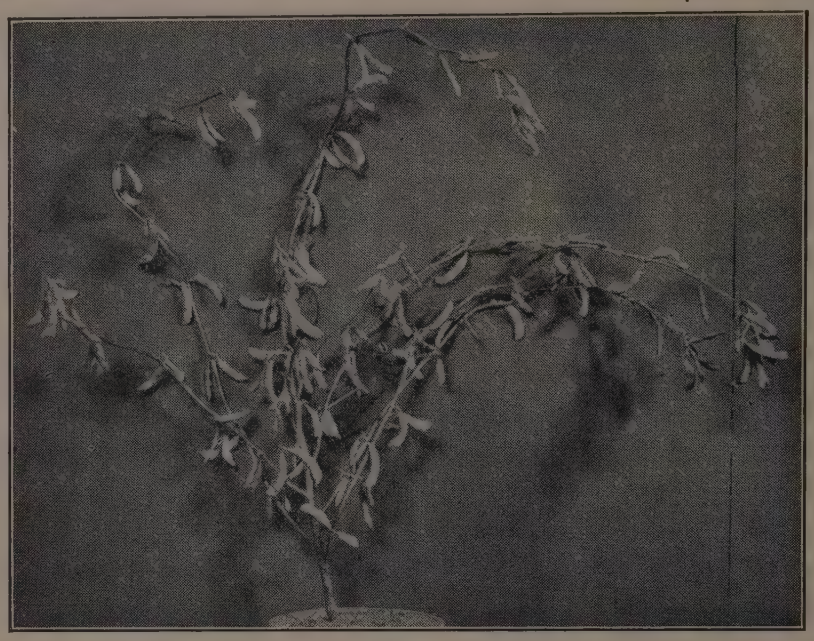
Mr. Bell experimented with two distinct sowings. In the first (A) he planted the rows 3 ft. apart and the seed 3 in. apart, at a depth of 1 in. This sowing was carried out on 10th November, germinated on 22nd November, and flowered on 9th February. It has not yet matured, but will be ready to harvest about 20th April.

The second experimental plot (B) was laid out in rows 3 ft. apart, with the seed 2 in. apart and 2 in. deep. This crop was sown on 16th November, germinated on 25th November, flowered on 26th January, and matured on 25th March.

It was noticeable that plot B produced more sturdy plants than plot A, and the majority of pods contained three beans. This may have been caused by planting the seed deeper than in the first. Plants in plot A were inclined to be spindly, and the majority of pods contained two beans. It is thought that the variation was possibly caused by the depth and space of planting.

Further, the wind affected rows A more than rows B, and there again surface planting less than 2 in. caused the roots to spread rather than to penetrate downwards. Rows B had slightly more surface than rows A.

The plant photographed has 173 pods, but some had more than 200 pods. Row B grew to 48 in., with moderate foliage, and row A to 60 in. with prolific foliage. Mr. Bell is unable to give the actual name of the variety, but the seed used was a Manchurian bean. There are thousands of varieties, varying in height from 12 in. to 60 in.



A soya-bean plant.

A considerable amount of soya bean is grown for hay in the United States, where it is generally considered to be equal, or even superior, to red clover or the best lucerne. It is used largely in the feeding of dairy cows and as a winter ration for young cattle. Mr. Bell is convinced that it is a cover crop to restore poor land.

A number of tobacco-growers were supplied with seed by Mr. Bell, and some instructive information was gained.

In the first experiment the seed was planted only 1 in. deep. The plant grew to a height of 54 in., with plenty of pods and foliage, but the wind was inclined to knock the plant about. The second experiment was in two rows in a tobacco field. The plants were a long time in flowering, but produced heavy foliage. When the tobacco was harvested the cows were turned in and made straight for the soya beans, and quickly consumed the lot. The third crop was sown on 15th November, germinated on 26th November, and flowered on 26th January. The rabbits then finished the crop. The fourth grower raised a very sturdy plant, bearing 208 pods. He planted three long rows, which were successful, and proposes planting this coming season as a cover crop.

The majority of the other reports are similar, although the exceptional season might account for the prolific growth of the bean.

Price of Raw Tobacco.

A. E. MORRISON, Solicitor, Department of Agriculture.

THE Board of Trade (Raw Tobacco Price) Regulations 1938, which came into force on 12th April, 1938, prescribe that no raw tobacco—that is, all unmanufactured tobacco, including the leaves and stems of the tobacco-plant before they have been passed through any process of manufacturing except curing—may be sold by or purchased from any grower at a price less than 1s. 2d. per pound f.o.b. Motueka or Nelson, in the case of tobacco grown in the Nelson Provincial District.

In the case of tobacco grown in any other district, no raw tobacco shall be similarly sold or purchased at a price less than 1s. 2d. per pound f.o.b. or f.o.r. the port or railway-station which is nearest to the place at which the tobacco is grown.

The Minister of Industries and Commerce, whose Department administers the regulations, may, however, authorize the sale and purchase of tobacco at a price less than the minimum price prescribed in any case where he considers it proper so to do.

Seasonal Tobacco Notes.

THE harvesting and flue-curing of yellow tobacco leaf is now completed in the Motueka-Nelson district, and the season has been a very good one for the production of good, bright leaf. The growers who have contracted with the tobacco-manufacturers were busy last month grading tobacco to the grades set by the purchasing companies.

This line of work has been undertaken much earlier than is usual. This haste is not in the best interests of the tobacco, which is greatly improved by the bulking down process, and should at least have two months in the bulk, where a mild fermentation takes place. The leaf becomes mellow, and the colours are more defined; shades of green disappear, and elasticity is established, with the gums brought to the surface. The month of April, however, will be the grading month for the majority of the growers.

Grading-tables.

There is room for improvement in the construction of the grading-tables used in the Motueka district. These are usually made with fixed grade divisions down the centre of a wide table, at which graders work on both sides, putting their selected leaves into the grade space common to all the workers. This method makes the slowness of any individual worker hard to detect, and incorrect grading cannot be charged to any particular worker.

The most useful table is a hollow square with a 1-ft.-wide board surrounding the worker and hinged to the wall, with the overhead light to the south. The leaf to be graded is placed in front of the operator who separates it into adjustable grade divisions on each side. Thus, each worker's speed and correctness of work are clearly shown. This tends to improvement of the individual, and fosters a competitive spirit; the indolent and careless worker is quickly detected, and if incapable of improvement can be put to some other class of work.

A description of Government export grades of tobacco will be dealt with next month.

Seasonal Work.

Another phase of seasonal work to be undertaken in the tobacco-field during April is the removal of the standing plant that has been stripped of its mature leaves, but which is still carrying an abundance of sucker leaves and blossom-heads. These should all be pulled up by the roots, laid straight in rows to dry, four planted rows being placed in one. When partially dry the leaves should be heaped and sprinkled with a little used engine oil and burned in the field, or removed entirely from the vicinity.

A very common practice in this district is to use a motor-tractor with heavy double disks to chop up the residue of a heavy crop of tobacco preparatory to ploughing it into the land. Under certain conditions this practice has the advantage of adding organic matter to the soil and is quite all right provided the plant so treated is free from disease, but as almost all of the remaining standing growths are infected with the mosaic disease tobacco-growers who are disking and ploughing in this infected material are certainly providing a source of infection for next year's tobacco-plants.

These old plants should be removed, root and branch, and destroyed.

—C. Lowe, Tobacco Instructor, Motueka.

COMMERCIAL FERTILIZERS

"Commercial Fertilizers and Their Basis of Sale" is the title of a text-book covering the whole field of manures used on a commercial scale in New Zealand, which has been prepared by Mr. J. A. Bruce, late Inspector of Fertilizers to the Department of Agriculture. Nobody connected in any way with the land can afford to be without the information contained in its pages. The price is 3/6, post free, and all you have to do is fill in the coupon.

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A.J.

Cool Storage of Fruit.

WHILE the fruit is coming into the cool store care must be taken to avoid too much accumulation of carbon dioxide. This condition becomes noticeable again when the store is full and accidental ventilation stops.

Blowing out three times a week is advisable at this stage, and is easily attended to early in the morning by opening packing-shed and chamber doors for ten minutes. The grading-out of the larger sizes of apples should be given attention early, and the placing of these in a position of easy access will save time and loss later in the year.

Granny Smith apples should not be placed in the cool store immediately after picking; they should be placed in a cool, dry position, and the stack well ventilated. They can be held in this way for from three to five weeks, according to state of maturity when picked. The tint or shade of colour will determine their readiness for cool storing. If these directions are followed and the fruit is given a chance to mature fairly well before picking there will be no losses from immature discoloration, commonly known as "scald."

The stacking of fruit correctly in the cool chamber is a very important factor in the cooling and air-conditioning of the room. Plenty of ventilation is necessary to allow the gases to escape freely and the fresh cool air to circulate around each tier of fruit-cases. Vertical ventilation is recommended, but the system of air-circulation is a factor which controls the method of stacking. Direct expansion, ceiling cooling, gives the best out-turn and is coming into general use.

All waste fruit should be removed from cool-storage premises daily.

—A. Powell, Cool Storage Officer, Wellington.

Vegetables, Small Fruits, and Flowers.

Contributed by the Horticultural Division.

Tomato Crops under Glass.

WHERE the annual tomato crop is grown each season on the same land for some years it is not surprising that difficulties often arise. Many of them are due to cultural problems which may occur anywhere, but the more serious are due to the strong establishment of diseases and pests which find this crop a favourite host. They are dealt with economically and effectively only by maintaining a high standard of cleanliness and observing a strict method of sanitation not only inside the houses, but outside in the vicinity—in the toolshed, and, in fact, about the whole premises. It is only when this is done that one may expect satisfactory results from chemical remedies. No grower is successful over a long period unless he carries out these principles rigorously.

In some of the warmer districts the crop in the unheated glasshouse is planted towards the end of July, but more often planting out under such conditions is done towards the end of August, and usually that is soon enough. The cultivation of the land and the fertilizers applied are usually satisfactory, but the maintenance of a supply of humus and the application of sufficient water are very commonly neglected. The diseases in the crop resulting in the past from the excessive use of stable manure led to the present fairly common state of a shortage of humus. The soil readily becomes dry and dusty, and lacks that active bacterial action which is recognized as a characteristic of fertility.

Watering Necessary.

In a light soil with an open subsoil considerable amounts of organic matter are required to maintain that condition. With a higher water-table and a heavier soil humus is consumed less rapidly. As land under glass does not receive the advantage of winter rains it is important to supply that deficiency by wetting soil and subsoil thoroughly three or four weeks before planting takes place. More than one application may be necessary to do this properly, but it is important that it should be done and the land allowed to warm up to a temperature of about 55 degrees F. before planting is commenced. Little watering will then be required during the difficult springtime period, and steady growth is less likely to be impeded.

An abundant crop of fruit on the Chinese gooseberry (Actinidia chinensis) ready for harvesting towards the end of May. It is a handsome, vigorous, and deciduous climber on good land in a medium to warm place.

Raising Seedling Plants.

Tomato seed for planting out under glass towards the end of August should be sown now ; another sowing for planting outside towards the end of October should be made in August. It is unsatisfactory to hold over surplus plants from the first sowing for outside planting at the date mentioned, as the plants will be stale and stunted, and cropping retarded as a result. The main requirements to obtain good plants are a satisfactory compost, sufficient heat, and close attention to ventilation, although ample light should by no means be forgotten after germination has taken place.

Where the compost is sterilized, turning and mixing is usually quite well done before filling the boxes. In other cases this necessary preparation is often neglected. By turning a heap of compost as soon as seedling weeds germinate the weeds are destroyed, and successive crops of the same kind are dealt with in a similar manner. The ingredients, too, are well mixed. Fungi and insects are also destroyed by these operations, and the chemical condition of the compost is improved.

Suitable Temperature.

A suitable temperature for raising these seedlings is 60 degrees F., with a limit either way of 55 degrees and 65 degrees F. They are raised in a propagating-house heated by means of hot water or electric cable, on a hotbed of composted stable manure in a glasshouse, or, later, outside in a warm sheltered position, or the frame

in a glasshouse is heated by means of oil burners. The young plants must be watered sparingly with tepid water, but they should never be allowed to become dry.

Ventilation should be given on all suitable occasions. This is, perhaps, the most difficult requirement to supply because of the demands on one's time at a busy season of the year, but it is fundamental to success and will save much work and anxiety later. Diseases indirectly caused by overheating and chilling plants are probably the commonest source of trouble in growing this crop.

Examination of Produce in Storage.

Potatoes, onions, pumpkins, &c., in storage should be examined at fairly close intervals at the beginning of the storage season to see that all is well and to obtain early intimation of whether deterioration is going to occur. Suitable varieties which are well cured and free from disease should not give much trouble in being stored without loss in a shed in which the temperature is fairly even and free from violent fluctuations.

Produce of less reliable quality will require close supervision, but in either case good ventilation, whenever it can be done without resulting in extreme temperatures, will lengthen the storage period as long as possible. This is most important during the early part of the storage period.

Early Vegetable Crops.

The preparation of the land for planting early crops in July and asparagus and rhubarb, &c., during August should be continued during mild dry weather. In many districts such conditions are rare at this season, and every advantage must be taken of the periods when they do occur. Cultivating the land when it is frosted or wet is bound to cause trouble, and in most cases it will be serious.

Control of Slugs and Snails.

In summer, when growth is plentiful, the browsing of slugs and snails is not so serious as during winter and early spring, when the plants are small. They may then do extensive damage in a very short time if not checked. Bluestone (copper sulphate) in any form and in the smallest quantities is intolerable to these creatures. If it is dehydrated and mixed with lime hydrate (slaked lime) at the rate of 1 part to 10 and thinly distributed with a "duster," or is finely ground and mixed with kainit at the rate of 1 part to 20 and distributed at the rate of 1 oz. per square yard it is very effective. In addition, they will not touch anything which has been sprayed with Bordeaux.

Alum is another effective slugicide. In solution or distributed thinly as a powder it may be used freely among growing plants without damaging them. A new and effective remedy is "Meta." One stick finely ground and mixed with a quart of bran and distributed thinly is a popular "remedy" in Europe just at present. At night in warm humid weather these creatures are most active, and treatments, generally, are best given then or during the afternoon preceding such periods.

Pruning Trees and Shrubs.

Pruning is done at different seasons with various objects, as, for instance, in early summer when disbudding and shortening new wood is done to some extent with the object of directing the growth of a plant, or in late summer when laterals may be shortened to encourage the formation of flower-buds on trees which carry their blossoms on "spurs" on the old wood. At this

★ Rail Trips to Tongariro ★

Luggage carried to Chateau

Luggage addressed and checked to National Park station for passengers travelling to the Chateau Tongariro, will be carried on to the Chateau and delivered to the owner on arrival at the hotel. Thus travellers are now free from the bother of claiming baggage at the station.

For all railway journeys, especially inter-island trips, passengers are advised to check their luggage the day before departure.

No bother about Baggage

winter period pruning is an important operation among deciduous trees and shrubs. Evergreens of that class are generally more tender, and are usually given this attention towards the end of winter or in early spring, especially when heavy cutting back is necessary.

Last month's note closed with a description of pruning treatment suitable for most kinds of trees and shrubs when young and at the time of planting out—treatment which is of the greatest importance, as, if early training is neglected or on the wrong lines, little can be done to improve it later.

Use Sharp Tools.

Trees and shrubs which are established and on their way to maturity should be carefully looked over at this season, and branches which are inclined to crowd too closely or cross the centre of the tree and chafe others should be removed entirely. The grower should make the cut close up and flush, using sharp tools (so that it may be smooth), and dressing with hot tar, paint, or bitumen emulsion all wounds of any size. When this is done with care it strengthens the frame of the plant, enabling it to carry better a weight of fruit if necessary, and to withstand the force of high winds. The pruning admits to all parts sufficient light and air for the desired growth of buds and foliage.

A few plants which have soft, spongy wood with large vessels, such as the grapevine, are best pruned in a way which leaves a stub extending beyond the bud from which growth is desired. The following year, or when the stub is dead, it should be removed flush with the living wood. This is especially important on those rare occasions when cuts are made into the old wood.

Trees and shrubs which have reached maturity and from which flowers and fruit are expected are often pruned systematically each year at this season with a view to the abundant renewal of wood of the fruiting type. This attention is usually reserved for some of the more useful hybrids. Hydrangeas and roses, which carry the bloom on new wood, have last season's growth thinned drastically by the complete removal of weak and crowded wood, and the remainder is shortened back to a few buds, the last of which points in an outward direction. It is from the ensuing new growth from these buds that next season's bloom is to be expected. Minor adjustments to this treatment will be required for certain varieties and for plants growing under certain conditions.

Late Pruning.

In localities where hard frosts may be expected during the springtime late pruning is practised so that new growth is delayed to avoid injury from that cause. Hydrangeas which are in a sunny position where summer bloom will get burnt, may be pruned hard and late, so that the main flowering period will be deferred until the autumn, when the conditions are more favourable. Roses of the class known as *Pernetiana*, hybrids originating in the yellow Austrian brier, resent having the young wood shortened back much, and heavy thinning is practised, and only the unripened end cut from the young wood. The effect is to induce strong new growth from the base of the plant. Black-currant bushes and gooseberries flower and fruit on last season's growth of wood if it is moderately vigorous and well ripened.

When pruning plants of this class at this time, weak wood and old wood is cut down to the bud at the base, from which new growth may be expected next season which will flower and fruit the following year. Wisteria, *Actinidia chinensis* (Chinese gooseberry), and others which flower on spurs on old laterals merely require the elimination of any strong growth which may upset the design to which the plant is being trained and such attention as may be required to keep the spurs in vigorous condition, as, for instance, shortening them to a moderately strong wood bud with a view to attracting growth to that section. The study and practice of pruning is one of the main factors in the successful management of very many plants.

Spotted-wilt Disease of Dahlias.

This trouble has been unpleasantly familiar in some tomato crops during the last decade. In one garden in the Gisborne district where rather a large collection of dahlias is grown 75 per cent. of the plants is affected, although one previous season the percentage attacked was very small. The symptoms in this instance were "more or less circular lines on the upper surface of the mature foliage, the rings being anywhere between about ¼ in. and 1 in. in diameter. Severely infected plants showed a dozen or more rings on an individual leaf and at times associated with yellow blotches. Most plants showed signs of diminishing vigour and the blooms were of less than normal size."

This trouble belongs to that rather mysterious class known as virus diseases, the causal principle of which eludes observation, but whose presence is demonstrated by cross inoculations. Identification is often difficult, as the symptoms vary widely according to the kind of plant affected, its age, and the conditions under which it is growing. The disease was first observed in crops of tomatoes growing near Melbourne in 1915–16, and has now been recorded from all of the States of Australia and over a wide area in Great Britain and California.

Spread by Insects.

Tests indicate that it is not seed-born, not spread by soil infection, and not so readily transmitted by inoculation as other virus diseases. The most important agent in the natural spread is by means of species of thrips insects, which must have been fed on an infected plant during the larval stage to transmit the disease. The evidence of plants recovering from the trouble is very slender.

The trouble is unique, in that it has a very long list of host plants, which includes as many as fourteen different plant families in England and as many as nineteen in California. The species of Compositæ and Solanaceæ susceptible are specially numerous. Other plants are lupin, broad bean, Iceland poppy, arum lily, nasturtium, and antirrhinum which are among those likely to carry the trouble over from one season to the next.

Good varieties of perennial plants, such as dahlias and chrysanthemums, which are propagated vegetatively, may readily become a serious loss after infection, as roots and tops must be destroyed. Infected chrysanthemums sent to Cheshunt Research Station are described as "showing brown areas on the leaves, small lesions on the stems, and withering of the flowers." In the circumstances, the best means of control is to keep a sharp look-out for any sign of infection and carefully to destroy infected plants as soon as they are observed, taking care to avoid carrying infection on hands or implements, &c. Insect-pest control must also receive attention, especially thrips, which seem to be chiefly responsible.

New Gardens.

Where new gardens are being made or additions and alterations to old ones are being carried out, the preliminary work should be done as soon as possible and as weather permits, so that ample time may be afforded for cleaning and setting the land before sowing grass-seeds and setting out trees and shrubs in August and September, which is about the limit of the "planting season" in most localities. Attention to drainage and repairs of paths and roadway may be given now as required; nothing about the homestead possibly contributes more to the appearance and efficient working of the place.

—Wm. C. Hyde, Horticulturist, Wellington.

Work for the Month in the Apiary.

Concrete Blocks for Hive Stands.

PRACTICALLY all beekeepers have experienced difficulty in constructing hive stands, and many and varied are the methods that have been adopted to raise hives from the ground, all more or less efficient.

The usual trouble experienced is that to put down a really good stand means making it permanent, but, as it is often advisable to move hives into different positions and sometimes to change a whole apiary site, the permanent stands become useless or are much damaged in removing them to other locations.

The use of concrete blocks on which to stand hives overcomes most of the difficulties. They are reasonable in cost, may be left in one position for an indefinite period, and may be easily transported at will.

The following method of forming these blocks has been supplied by a well-known Southland commercial apiarist who has been using this form of hive stand for more than eight years, and who states that he has yet to find a better form of hive stand.

The blocks are cast in timber moulds. Having a depth of 6¼ in., the ends of the mould are 5 in. wide at the top, and the sides taper to the base, which is 3 in. wide. The length of the bottom board is 20 in. The finished concrete block is 19 in. long by 5 in. wide at the base, and 17 in. long and 3 in. wide at the top. The sides, which are tapering, are 6 in. high.

Fig. 2.—Concrete blocks in use under hives.

[Photo by H. Drake.

The framework should be well nailed together, and the inside surface of the moulds must be of dressed timber. The gravel used should be clean river gravel, sifted through a 1 in. mesh sieve, which can be made by using 1 in. mesh wire netting.

The mixture used consists of one part Portland cement and six parts gravel. This should be spread on a clean floor or piece of concrete and turned three times dry. Water is then added slowly to make the mixture wet but not too sloppy, and the mixture is again turned three times, when it is ready for placing in the moulds. The wooden moulds are thoroughly painted with old car oil each time before being used, to prevent the cement mixture adhering. It is advisable to have about forty moulds, and to use one bag of cement at a mixing. The concrete should be placed in moulds as soon as mixed.

When filling the mould the mixture should be carefully pressed in, and, when full, it is advisable to give it a shake or a few sharp taps to ensure the mixture going well into the corners. When filled, the moulds are stood on level ground, placed closely together, and covered with damp sacks to prevent them drying out too quickly.

The blocks must be allowed to remain in the moulds for at least a week before being turned out. This is accomplished by turning the moulds over, top or big side downwards, when the blocks will, if the mould has been properly oiled, slide out easily. Before being used they should be carefully stacked in a shady place for a few weeks to become seasoned.

When the moulds are three parts full three or four clean stones may be pressed in to save gravel. No reinforcing is required for ordinary use, but if constant shifting is contemplated the blocks may be reinforced by adding pieces of old hooping-iron or old fencing-wire. New galvanized wire should not be used. The reinforcing material should be placed in the moulds when they are about half full, adding the remainder of the concrete to cover the reinforcing. The wire or hoop-iron used should be about 15½ in. long.

Fig. 1.—Concrete blocks and moulds.

[Photo by H. Drake.

One bag of cement will make thirty-six or forty blocks, and one yard of gravel will require three and a half bags of cement. The finished block weighs about 32 lb., absorbs less moisture than bricks or wood, lasts a lifetime if carefully handled, and is readily picked up any time for shifting.

These blocks keep the hives well off the ground and allow a free passage of air under the hives, and they are also useful for placing on top of hives in apiaries exposed to the wind. Where gravel is handy, and exclusive of the cost of labour, allowing 8s. per bag of cement, the approximate cost of these blocks will be 3d. each.

For details of this article I am indebted to Mr. W. T. Herron, "Greenvale Apiaries," Waikaka, Southland.

—D. S. Robinson, Dunedin.

Precautions for the Winter Months.

BEFORE the cold weather sets in every hive should be examined to see that the frames are completely covered with sufficient dry well-fitting mats to keep the bees protected. Any damp or mouldy mat should be replaced by a dry one, and the roof examined and repaired. No draughts should be allowed around the frames.

Mats made of corn-sacks cut to the exact size of a zinc queen-excluder answer all requirements for warmth, but be sure they are placed in their exact position. If placed crookedly, the edges are apt to be pushed out between the hive-body and the roof, and will, in time, absorb enough moisture to make them damp and unwholesome.

Once more the time approaches when the necessity for shelter should impress itself on the beekeeper. It is most essential that the bees be protected from cold winds during the winter. Should no permanent shelter be available, something temporary should be erected if the bees are expected to prove in normal condition in the spring. Manuka scrub is excellent for making a temporary wind-break.

Marketing the Crop.

Whatever the market for which the beekeeper designs his crop, every care should be taken to see that the regulations regarding sales are observed. It is too late this season to impress on beekeepers the advisability of putting their honey in new tins for the export market, but it is to be hoped that before next season arrives they will have grasped the fact that the use of second-hand tins is a retrograde step in an otherwise promising industry. Be sure that all honey intended or export is thoroughly granulated before it is sent forward to the grade stores.

For local trade, clean attractive packages are, of course, a necessity, and, in accordance with the Sale of Food and Drugs Act, they must be plainly marked with the producer's name and address and description of the contents, including the net weight. No honey should be labelled "pure clover honey" unless the beekeeper is certain that the bees worked no other flowers. The correct description of most lines is "pure honey." It is no unusual thing to see honey of a dark-amber tint labelled "pure clover honey." This is incorrect and misleading, as clover honey is among the whitest produced.

Treatment of Wax.

With the advent of colder weather, the beekeeper should turn his attention to the proper treatment of his wax. There is little peace for the beekeeper who endeavours to render wax during hot weather unless he works in a bee-tight room or at some distance from the apiary. Nothing attracts the bees so much as the smell of melting wax. The wax, however, should be treated, or clarified, in good time, so that if the beekeeper decides to have it converted he will be able to place his order in time to have his foundation ready before next season is upon him.

If he possesses a solar extractor and has put it to good use much of his wax will require little treatment to become a first-class article. The cakes from the solar extractor should be scraped of any refuse which may cling to them, and melted in clean, hot water. If possible, do not allow the wax to boil. The water should be hot enough completely to melt the wax, which should be well stirred during the process. After it is melted the vessel containing the water and wax should be set aside to cool as gradually as possible.

A petrol-tin is a handy utensil in which to clarify wax in quantities up to 10 lb. or 12 lb., and this can be placed inside a wooden box and packed on all sides with corn-sacks or sawdust and similar material to prevent rapid cooling. Be sure the top surface of the tin is covered. This gradual cooling not only assists the clarifying, but also ensures that the cakes will remain uncracked. When cold, the cake of wax can be removed from the water and once more scraped, when it will usually be found fit for foundation-making or any other purpose.

Use of Wax-press.

Where the wax still exists as old combs, burr-combs, or other forms common to an apiary it should first be melted in quantity in a copper or similar large vessel, and afterwards put through a wax-press. Of these latter, the steam-heated one is the best on the market, and is an absolute necessity where large quantities of comb are to be handled. The melted wax and water are poured into a scrim bag inside the press, where pressure may be applied when the water and wax cease to flow freely. The scrim bag retains the slum-gum, and there will be a steady stream from the escape-pipe into whatever receptacle is provided. Again, a benzine-tin is a handy utensil.

As the water and wax fill the tin, the use of a kerosene-pump is of service. It reaches the bottom of the benzine-tin, and the water can be drawn off and the wax left in the tin, thus obviating the use of too many containers. As before, the wax should be cooled, immersed in fresh water, and melted until the cakes attain the standard of commercial cleanliness. The slum-gum obtained in the process must be carefully gathered up and destroyed by fire.

Plans for Next Season.

The off season is the best time to make plans for the following season. The beekeeper should decide what increase he desires to make and should prepare accordingly. Making up hives and frames is exasperating work if left until the bees are crying out for room, and it should be finished long before the actual time for increasing one's stock arrives. The beekeeper should also face the question of providing himself with stocks of foundation, and with making arrangements for the treatment of his surplus wax by some neighbouring maker of foundation. The beekeeper should also decide on which market he wishes to place his crop, and should lay his plans accordingly.

It is advisable, too, that he consider the theoretical side of his occupation, and that he study, while the bees are in a dormant condition, the best methods of improving his stocks. Neither weather conditions, locality, nor any other factor will influence the honey-crop so much as strong colonies of bees, and the apiarist should endeavour, while he has the time, to ensure that these shall be in existence during the coming summer.

—E. A. Earp, Senior Apiary Instructor.

Poultry-keeping Section.

Breeding Methods for Good Stock.

INVESTIGATORS have given much study to breeding methods, and much has been written of the origin of the domestic fowl. Although the question seems still unsettled, it is generally accepted that the majority of fowls are descended from the jungle fowl of India (*Gallus Bankiva*), and from generations of control, with careful selection in mating and breeding, have been evolved and developed most of our beautiful and useful breeds of poultry.

The successful breeder is the one who can select stock which, when mated, will produce progeny nearest to the standard of perfection or object aimed at. Breeding is not only the most important, but is also the most interesting phase of poultry-keeping, and perhaps what makes it so interesting is the fact that after so many years of study, selection, and breeding it can be said that little is really known about this great subject, or why certain matings should produce the class of offspring that they at times do. The only way to gauge the true value of the individual bird as a breeder or any particular mating system is to test out the progeny, or, in other words, by the performance of the offspring.

Four Mating Methods.

There are four mating methods, or breeding practices—grading-up, cross-breeding, line-breeding, and out-breeding. By "grading-up" is meant the practice of mating nondescript or mongrel hens with a purebred male, and with each successive generation mating the progeny with a purebred male of the same variety as the first. This system of breeding is recommended only in certain circumstances, for it is much more satisfactory for the beginner to purchase a few purebred birds and build up a flock from a good foundation.

However, some poultry-keepers are uninterested, and the best way to make them realize the great difference between the mongrel and the better-bred stock is to induce them to start a method of grading-up. Even to-day too many nondescript birds are kept, and in such cases it would be good for the industry if even a grading-up method of breeding were adopted, as great improvement would be effected in both quality and production.

A Warning.

Poultry-keepers who try this method of breeding will find that some of the cockerels produced in the second or third generation will look so like standard-bred birds that there will be a great temptation to use them instead of purchasing a purebred bird. This should never be done, for it must be remembered that if graded-up males are used the improvement gained would very soon be lost.

Cross-breeding.

Cross-breeding is the practice of mating birds of different pure breeds. From such a mating the first generation will very often turn out very useful stock, and the birds will be more or less uniform; but it is never wise to breed from cross-bred birds, because the offspring usually prove unsatisfactory.

Sex-linked Inheritance.

This is a method of cross-mating used for distinguishing sex at hatching-time. In this class of mating the sons resemble the mother more in colour and the daughters the father. For instance, when a Brown Leghorn male is crossed with a Light Sussex hen the cockerel chicks are a pale creamy colour and generally have slight dark markings on the head and perhaps on the rump. The pullet chicks are golden-brown coloured, with some indistinct dark markings on the head and back, where the brown strip of a pure Brown Leghorn chick is found.

The success of any cross-breeding will, of course, depend upon the individual birds mated. If eggs are the object aimed at, they must be from good laying stock. Although some poultry-keepers claim that first cross-stock possess more vigour and constitution than purebred birds, the great majority prefer to keep their stock pure, and the beginner would be well advised not to go in for crossing, as he will obtain more satisfaction and profit from a flock of well-selected purebred birds, and, if care is taken to see that vigour and constitution are the chief points in selecting breeding-stock, there is no reason why they should not possess the desired stamina.

Line-breeding.

Line-breeding is really a systematic form of in-breeding, where certain ancestors will appear in the pedigree of the offspring more often than any other.

Some breeders have found that by a system of line-breeding, coupled with very careful selection and concentration on desirable characters or qualities, they have made rapid improvement in their stock. There are line-breeding charts that have been followed with success, but the great danger of line-breeding lies in the fact that while this system of breeding is likely to improve good characters it is just as likely to strengthen any undesirable characters that the parents may possess. There is also a tendency to a loss of vigour in line-bred stock, especially where great egg-production has been the object and the selection of breeders has been in the hands of one of insufficient experience.

Those who have made a success of line-breeding are men who have a special aptitude for detecting that special goodness in certain birds who have never failed to cull heavily and have rigidly relied upon breed characters and constitutional vigour as the chief points when selecting breeding-birds. It is not the safest method for the amateur to adopt.

Out-breeding.

By "out-breeding" is meant the mating of more or less unrelated birds of the same breed. The breeder who introduces some fresh blood every few years may be said to practise out-breeding. This is the most popular breeding practice with commercial poultry-keepers and the safest with the amateur, although there is a difference of opinion as to how often fresh blood should be introduced.

It is true that there is always a certain amount of risk in out-crossing, and that the cross of strange blood may give an impulse of reversion of some undesirable

latent characters. Most of our strains of White Leghorns are so well established, however, that there is not the same risk of the careful introduction of fresh blood having an upsetting effect as was the case some years ago. Some flocks have been maintained at a high standard of quality, size, and production for a number of years without the introduction of fresh blood, and some strains seem to stand close breeding better than others, but in the majority of cases there is usually a tendency to a loss of size, stamina, and disease-resisting power after three or four years if some fresh blood is not introduced.

Time to Introduce Fresh Blood.

As in many other phases of poultry culture, one cannot be dogmatic when giving advice on the time to introduce fresh blood, as so much depends upon the personal factor and environment. After a number of years of visiting poultry-keepers and selecting and mating stock, however, it would appear that the average commercial White Leghorn breeder would be wise to make a point of introducing some fresh blood at least every three years, even though his flock may appear quite satisfactory. The wise breeder looks ahead and is usually testing out one, or even two, fresh lines in order to be ready to introduce some fresh blood at the very first sign of a decline in stamina, body size, or size of eggs.

How to Introduce New Blood.

New blood should be introduced cautiously. This may be done by purchasing a good cockerel or two and mating them with some of the best hens of the home flock. If the result of such mating turns out satisfactorily and the pullets do well, then the cockerels can be used to introduce new blood further into the flock. Should the breeder requiring the change happen to have a prepotent male bird (one that has that rare quality of being able to stamp his good characteristics to a great degree upon his offspring), he would be wise to purchase a few good hens and mate them with the proved male, and if the pullets from this mating do well it should be safe to use their brothers with more of the main flock.

Individuality and Environment.

As indicated, success with breeding depends more upon the selecting of the individual breeding birds than upon what system is adopted, but the great importance of environment should not be underestimated, for the best of birds will never give the best results under poor management.

Disease-control.

If disease is to be kept in check and controlled it will depend largely upon the poultry-keeper himself, for the best way to tackle the question is in the natural way—by breeding and managing the birds in a manner that will encourage constitutional vigour and disease-resisting power.

—C. J. C. Cussen, Chief Poultry Instructor, Wellington.

Answer to Inquiry.

Arsenic Pentoxide Spray.

G. H. M. (Otui, Wanganui River) :—

In the last issue of the *Journal* is an article on the "Eradication of Hard Fern," by K. M. Montgomery, of Te Kuiti. In it he states that Messrs. Levy and Madden's experiments show that an arsenic pentoxide spray of a 1–320 solution is the most reliable in use. Will you please inform me whether that statement is correct?

Acting on Mr. Levy's advice given some years ago, I am using arsenic pentoxide on the Wanganui River, but I am using a 2½-per-cent. solution, which is eight times the strength of the 1–320 solution mentioned above.

Fields Division :—

The strength of 1–320 is recommended by Messrs. Levy and Madden as being the most effective in actually killing the plants, and can also be used effectively on clumps too small to carry a hot fire and particularly for killing off the edges of clumps burnt out by firing and odd plants missed by the fire. On shady faces where a hot fire is not possible this strength is also useful in getting a complete kill of plants.

Solutions of 1–120 and 1–180 killed off the tops of the plants too quickly, the poison not penetrating through the tissues to the rhizomes, many of which grew again. Weaker solutions of 1–480 and 1–560, while effective in browning off the growth sufficiently to carry a hot fire, were not strong enough to kill the rhizomes. The weaker solutions would be suitable for spraying dense clumps on shady faces prior to firing and following with a spray of 1–320 for killing round the edges and dealing with odd plants, &c.

According to the experiments quoted, the solution you have been using is needlessly strong, and, while effective as a preparation for firing, would not be so effective for killing the rhizomes as that recommended in Mr. Montgomery's article.

Slaughterings of Stock.

THE following return of slaughterings of stock at meat-export slaughterhouses and abattoirs for the eleven months, May, 1937, to March, 1938, has been compiled by the Live-stock Division :—

——	Cattle.	Calves.	Sheep.	Sheep, of which Ewes.	Lambs.	Pigs.
North Island.						
Meat-export slaughterhouses—						
Auckland	122,473	593,125	261,836	149,791	1,104,809	396,667
Poverty Bay-Hawke's Bay	26,080	41,012	485,018	190,607	1,032,110	41,715
Taranaki-Manawatu	77,869	245,879	432,110	213,689	1,356,942	221,585
Wellington-Wairarapa	32,333	27,176	397,624	166,006	938,945	51,648
Totals	258,755	907,192	1,576,588	720,093	4,432,806	711,615
Abattoirs	109,568	36,903	331,280	193,123	54,422	103,871
North Island totals	368,323	944,095	1,907,868	913,216	4,487,228	815,486
South Island.						
Meat-export slaughterhouses—						
Nelson-Marlborough	368	8,911	11,335	6,040	146,344	11,443
Canterbury	15,435	38,018	395,581	285,717	1,945,221	44,697
Otago-Southland	10,349	47,930	190,839	161,050	2,227,275	4,923
Totals	26,152	94,859	597,755	452,807	4,318,840	61,063
Abattoirs	55,111	13,925	228,268	108,697	35,520	26,808
South Island totals	81,263	108,784	826,023	561,504	4,354,360	87,871
Dominion.						
Meat-export slaughterhouses	284,907	1,002,051	2,174,343	1,172,900	8,751,646	772,678
Abattoirs	164,679	50,828	559,548	301,820	89,942	130,679
Grand totals	449,586	1,052,879	2,733,891	1,474,720	8,841,588	903,357

N.Z. Federation of Young Farmers' Clubs.

Edited by S. Freeman, Dominion Organizing Secretary.

New Zealand Team's Return from Australia.

Visit of United Kingdom Young Farmers to Dominion

THE five New Zealand Y.F.C. members—C. M. Whatman, A. Fisher, H. McKenzie, A. Cowan, and A. Viles—who left the Dominion on 8th February to take part in the Empire Young Farmers' tour of Australia returned to Wellington on 19th April, after a very instructive and pleasurable period of nearly ten weeks in Australia. They brought back with them on the "Awatea" the four United Kingdom young farmers who accompanied them on their tour of South Australia and New South Wales. The visitors came from different parts of the United Kingdom—E. Christopher from England, I. Gilmour from Scotland, E. Williams from Wales, and R. Gamble from Northern Ireland.

Members of the New Zealand party were met by their relatives and friends on the arrival of the "Awatea" at Queen's Wharf, Wellington. In spite of the wonderful tour, they were all glad to be back in New Zealand, with the prospect of being in their own homes within a few hours.

The visitors were shown around Wellington during the day by the Y.F.C. Organizing Secretary, Mr. S. Freeman. They saw the city from the top of Mount Victoria, and after a trip round the bays visited the Rongotai Aerodrome, where two of them embarked for a more comprehensive view of Wellington from the air. Mr. Freeman accompanied them that night on the steamer to the South Island, where they stayed for a week, visiting places of interest as far as Oamaru, before returning to Wellington for a trip through the North Island. They left New Zealand from Auckland by the "Awatea" for Sydney on Monday, 9th May, after a stay of nearly three weeks.

While in the Wairarapa the visitors took part in the district annual stock-judging competitions, and won a special contest which had been arranged between the United Kingdom team, the New Zealand team, and a picked Wairarapa team. R. Gamble was also first in the open class for judging Ayrshires, and the others also acquitted themselves quite well.

Details of the Wairarapa competitions will be included in a full account of the United Kingdom Young Farmers' New Zealand tour, which will be published in these pages next month.

Impressions of South Australia.

A. R. Viles, Apiti Club.

WE arrived in Adelaide on Sunday, 13th February, after a two-day trip through very dry country. South Australia has no movement like our Y.F.C. organization, but has something very similar to our boys' and girls' agricultural clubs in their schools. We were the guests of the Urrbrae Agricultural High School while in Adelaide, and were billeted out in private homes. Our tour of Australia really commenced on Monday, 14th February, when we met the four members of the British team. Mr. Adey, Director of Education, and Mr. Spafford, Director of Agriculture in South Australia, welcomed us and gave brief talks on the State.

Fig. 1.—Haystack containing 240 tons at Roseworthy College, South Australia. (Note the mouse-proof fence).

We visited a sheep and cattle sale at the abattoirs, where we saw one small line of very good Southdown-Merino cross lambs. Most of the sheep were Merinos, but for killing lines they were not of a very high standard. The cattle are often travelled up to 600 miles to the works, and consequently do not look very well when offered for sale. Herefords dominated, and each beast is offered separately, the values being similar to ours.

The abattoirs are the only works in a large area, and stock from away in the interior are trucked to Adelaide. The chain system is used for killing both cattle and sheep, seventy men working to a chain on sheep. The quality of the sheep that we saw killed were rather poor.

Visit to Orchard.

The Blackwood Experimental Orchard, situated in the hills around Adelaide, is used for the selection of suitable varieties of fruit and for the development of methods for combating diseases. More than four thousand varieties of fruits are grown in this one orchard. Orcharding is a very important industry in the hills, apples, peaches, and apricots being grown. The Parafield Poultry Farm is used for the breeding of stud stock, which are sold to farmers at a reasonable price, thus tending to raise the standard of the poultry throughout the State.

Mr. Melrose, at Mount Pleasant, gave us a delightful day at his home twenty-six miles from Adelaide. He keeps a stud of Polled Angus cattle, and here I saw some of the largest beasts I have seen of this breed. Southdowns are bred here, and he crosses them with the Merino for fat lambs. Grass fires are a big problem. A few years ago all his fences and stacks were burnt, so he now uses all concrete posts.

Fig. 2.—Lucerne stand, irrigated from a bore half a mile away, at Rosebank Station, South Australia.

A very interesting two days were spent at Roseworthy College, which is the equivalent of our Massey and Lincoln colleges. Here students may gain practical experience in farming, or study for degrees in agriculture. This is the only place in Australia where degrees in wine-making can be procured. About 40 acres of grapes are grown, and a small pressing and distilling plant is maintained.

Wheat-breeding is extensively carried on, and all the grain is used for seed purposes. Of a total of 3,000 bags, 1,500 are sold to farmers as pure seed. The wheat land is broken up in June or July by ploughs varying from nine to fourteen furrows, some using skeleton mole-boards to break up the furrow. All the horses are worked abreast. The chief aim in working a fallow is to conserve the moisture and yet prepare a fine seed-bed underneath with a coarser surface to stop evaporation.

Inspection of Vinery.

A very profitable day was spent around the Nuriootpa district, about fifty miles from Adelaide. Here we saw a marble quarry, dried-fruit packing, and acres of vines. We inspected Seppelt's vinery. The season was due to start and the vats were being cleaned and waxed ready to receive the grape juice. Two million gallons of wine were in storage, valued at £1 a gallon. It is matured in oak casks varying in size from 36 gallons to 800 gallons.

Murray Bridge was next visited, and we saw the fertile irrigated flats, which impressed us greatly. An article on Woods Point Station was written by a fellow-tourist, Mr. A. Cowan, and appeared in the March number of the *Journal of Agriculture;* this gives a very excellent description of what interested us so much. In this district oranges are grown to perfection on the slopes, almonds also being prominent. The land away from the river is nearly useless, as it is very light and sandy and subject to drifting. Very poor wheat crops are grown, for erosion constantly shifts the soil.

We caught the "Strathmore" on the 26th February at Adelaide for Sydney, and from there we travelled through New South Wales.

Bay of Plenty Clubs' Debating Competition.

(Continued from notes in the March *Journal*.)

Second Round Debates.

ON the 28th March the Te Puke Club team, consisting of Messrs. R. Reid (leader), T. Tanner, P. Delaney, and D. Reid, met the Katikati team in a debate on "All-grass Farming versus Combination of Cropping and Pastures." The Katikati team, consisting of Messrs. Hooker (leader), Walford, Wade, and Grainger, supported the "All-grass" theory, and after a most interesting contest emerged the winners by a narrow margin.

On the same evening the Waimana and Edgecumbe Clubs debated at Edgecumbe on the same subject. So keen and even was the contest that at the conclusion the two judges were unable to separate the teams. A further contest at Waimana was arranged for the following Monday, but in travelling to Waimana the Edgecumbe team was trapped by slips in the Waimana Gorge. This necessitated a postponement until the 7th April, when the Edgecumbe Club again went to Waimana, and was narrowly defeated in a most interesting contest.

Final Debate.

On the 11th April the Katikati team and the Waimana team met at Te Puke in the final contest for the Debating Shield. The subject for debate was "That Disease Control in Dairy Stock is of Greater Economic Importance than the Breeding of Highly Producing Strains of Dairy Cattle." The Katikati team, taking the affirmative, consisted of Messrs. Hooker (leader), Wade, Grainger, and Walford. The members of the Waimana team were Messrs. Woolfield (leader), H. White, McDonald, and R. White.

The debate created a good deal of interest, and drew an attendance of about sixty from most clubs and from the general public. Mr. F. Cook, Headmaster of the Te Puke High School, acted as judge. After a close contest the Katikati Club emerged the winners, and thus will have the honour of holding the shield for the first year of its award.

Central Otago Members Visit Canterbury.

A PARTY of Central Otago members left by bus for Canterbury on Monday, 4th April. The bus left Dunedin in the early morning for Alexandra, via Roxburgh, picking up members of various clubs *en route*. At Alexandra members of the Arrowtown Club joined the party, which was entertained at lunch by the Alexandra Club. In the afternoon the party left for Oamaru, via Palmerston, picking up more members at Becks and Ranfurly. Oamaru was reached at 7 p.m.

On Tuesday, *en route* to Timaru, members were conducted over the Redcliff irrigation scheme by Mr. W. Stafford, of the Department of Agriculture. On Mr. Ruddenklau's property pastures and lucerne laid out in the contour and border irrigation systems were inspected. A 100 acre paddock of potatoes ready for digging, 100 acres of Montgomery red clover ready for harvesting (worth approximately £3,000 when bagged up), and a stack of twenty thousand bales of lucerne hay were seen during the morning.

After lunch at Waimate, Mr. D. Kelly's potato patch was visited, where a single-row digger and a tractor-drawn two-row digger were engaged in lifting the potatoes. At Timaru the party was conducted over the Timaru flour-mill, and also through the miniature milling and baking laboratory. The National Mortgage and Agency Co.'s seed-cleaning plant was also inspected. On Wednesday the Levels irrigation scheme was visited.

Other visits included "Longbeach," the estate of Mr. J. H. Grigg, where the party inspected Corriedale and Southdown sheep, thoroughbreds and hunters, Friesian cattle, and also the pastures. The electric tractor of Mr. G. H. B. Lill, who had it working for the party, was much commented upon. A paddock of cocksfoot used solely for seed-production was also of great interest.

Thursday morning was spent on the Winchmore irrigation scheme, which, when completed, will serve 68,000 acres. The machinery working on this scheme was of great interest to the party. The sight of tractor shovels, 90 horse-power Diesel caterpillar tractors, giant grabs, scoops, and elevators all engaged in the work of excavating the 1,000 cusec main race was alone worth the trip. Probably the most interesting implement was the dredger which was excavating part of the main race. This machine does the work of 160 men in taking out 80 yards of spoil per hour and depositing it on the banks of the race. After lunch at Methven the party attended the Methven sale. The headworks of the Winchmore irrigation scheme on the banks of the Rangitata River were then inspected, and the party proceeded to Fairlie to spend the night.

On Friday the party returned to Oamaru past Lakes Tekapo and Pukaki and continued through the Lindis Pass to Alexandra, where the Arrowtown, Roxburgh, and Alexandra members left the bus, which proceeded to Becks, and the following day returned to Dunedin, via Ranfurly and Middlemarch.

Massey College

SHORT COURSES

for the remainder of

1938

Dairy Farming -	20th June to 1st July
Herd Testing -	5th to 22nd July
Homemakers' Course in Domestic Science	1st to 18th November
Treatment of Milk for City Supply	One week in August

Full particulars may be obtained on application to

THE REGISTRAR, P.O. BOX 367, PALMERSTON NORTH.

New Clubs Formed.

THE following new clubs have recently been formed: Broadwood and Oruru (Kaitaia district, North Auckland); Matarau (Whangarei district); Parawera and Te Kowhai (Waikato); Waihi (Bay of Plenty); Rotorua-Ngongotaha (Rotorua district); Westmere (Wanganui district); Bunnythorpe and Colyton (Manawatu); Pleasant Point (South Canterbury); Lochiel (Western Southland).

Among the Clubs: Reports on Activities.

Otago and Southland.

Arrowtown.—Discussion on Educational Week at Waitaki. Talk by Mr. McDonald (Queensland) on "The White Butterfly."

Clinton.—Arrangements for a debate with the Clinton Branch of the Farmers' Union. Discussion and two-minute impromptu speeches.

Crookston. — Arrangements for card party and dance. Discussion on the programme of lectures, &c., for the year.

Dipton.—Debate on "The Best Method of Tailing Lambs." Those who favoured the searing-irons won the contest by four points.

Enfield.—Discussion on the proposed 4YA broadcasting session for young farmers, and also of the projected tour by members of the clubs in the district; nineteen members of the club signified their intention of taking part if the tour eventuated.

Five Forks.—Address by Mr. M. Austin on "Interesting Subjects in Farm Life."

Hampden.—Lecture by Mr. D. J. Ross (club president) on "Land Values and Farm Costs." A synopsis of the Dairy Act was read and discussed.

Manuherikia.—Lecture by Mr. G. G. Calder, Department of Agriculture, on "Grasses." Mr. S. H. Saxby, of the Department, gave an outline of the projected Y.F.C. Agricultural Week at the Waitaki High School.

Milton.—Address by Mr. H. McCallum on his trip abroad, dealing mainly with England.

Otama.—Discussions regarding a proposed tour and the Agricultural Week to be held at Waitaki.

Palmerston South.—Talk by Mr. R. Smith, who gave a very detailed account of his recent tour of various irrigation schemes.

Papakaio. — Discussion, &c. Decided to accept the invitation of the Oamaru Toc H group to be present at one of their meetings.

Roxburgh.—Talks by club members, the subject being "The Future of the Primary Producing Industries of New Zealand"; a cup presented for the best speaker was won by B. Gilmour.

Thornbury.—Lantern lecture by Mr. Harris. The speaker showed a number of slides depicting other young farmers' clubs' activities. A field-day was held at Makarewa, with a total attendance of forty, which included eighteen visiting members. Under the guidance of Mr. Falconer the party made a tour of inspection of the freezing-works. Demonstrations included such matters as "The Care of Sheep when Drafting," "Lamb Carcasses affected with Hydatid Cysts," and "Type of Lamb suitable for Export."

Upper Clutha.—Address by Mr. L. R. Morris, on "Continuous Cropping."

Canterbury.

Cust.—Discussion on programme of lectures, &c., for the year.

Darfield.—Decided to hold wool-classing courses of twelve lessons in 1938 and twelve in 1939; instructor, Mr. Morrow. Arranged for the club to give two broadcast talks over 3YA. Two judging competitions to be run at the Sheffield A. and P. Show. It was announced that the club stacking-competition had been won by Ron. Fechneg, Aylesbury.

Ellesmere.—Dr. M. M. Burns gave an interesting address on "Soil Conditions in the U.S.A.," and followed this by showing a film on scenic spots in U.S.A. At the previous meeting a debate was held, the subject being "That the Young Farmer of To-day has Greater Opportunities than his Grandfather." The debate was won by the affirmative, the speakers being K. McGill and L. C. Coe; those speaking for the negative were C. Tod and H. G. Stephens.

Hawarden.—Programme for meetings arranged; social, &c., finalized. A field-day was held, which was attended by local farmers as well as by club members. Demonstrations included Corriedales (Mr. O. T. Evans), horses (Mr. H. E. Fincham), and lucerne (Mr. J. Heasley).

Oxford.—Arrangements for annual ball. Discussion regarding proposed radio broadcast from 3YA.

Pleasant Point.—Address by Mr. Alan Grant, Chairman of the South Canterbury Y.F.C. District Committee, outlining the origin and development of the Y.F.C. movement. This was followed by a talk by Mr. A. B. Struthers on "The Conduct of Meetings." This is a newly-formed club with good prospects; the membership has already reached twenty-five.

Springston. — Lecture on "Breeding Problems" by Mr. J. Stafford, Veterinary Surgeon.

Waihaorunga.—Talk by Mr. C. C. Leitch, Department of Agriculture, on "The Work of a Young Farmers' Club."

Marlborough.

Blenheim.—Lecture by Mr. Shand, Inspector of Stock, on "The External Parasites of Sheep (Ticks and Lice)," dealing with their life-cycle and their control by dipping.

Nelson.

Motupiko.—Discussion on Y.F.C. constitution. Recommendations for consideration at the annual club meeting regarding the holding of social evenings, &c., and arranging of field-days.

Moutere.—Lecture by Mr. Merry, Department of Agriculture, on "Modern Fertilizers: Their Manufacture and Application."

Manawatu.

Bunnythorpe.—Lecture by Mr. C. J. Hamblyn, Department of Agriculture, on "Pasture Establishment."

Johnsonville.—Lecture by Mr. A. J. Galpin, Department of Agriculture, on "Lucerne."

Kimbolton.—Arrangements for a debate at the next meeting. Lecture by Mr. E. E. Elphick, Government Veterinarian, on "Feed and Feeding." At the previous meeting Mr. A. J. Galpin, Department of Agriculture, gave a lecture on "Subterranean Clover."

Otaki - Te Horo.—Film dealing with farm tractors.

Paraparaumu. — Lecture by Mr. Gorman, Plant Research Station, on "Grasses and Clovers."

Pohangina Valley.—Field-day at the Plant Research Station, Palmerston North. Twenty-seven members attended.

Rangiotu.—Discussion on the coming season's programme. Mr. A. J. Galpin, Department of Agriculture, gave a talk on Y.F.C. activities and the organization generally. The proposed camping tour was discussed, several members intimating that they would be taking part.

Rangiwahia.—Lecture by Mr. A. J. Galpin, Department of Agriculture, on "Subterranean Clover." A field-day was held on Mr. W. Deihl's property; demonstrations included roping and castrating a young horse by Mr. S. Stent.

Shannon.—Address by Mr. A. J. Galpin on coming Y.F.C. activities, including the Manawatu educational tour of the North Island, and the proposed Y.F.C. demonstrations, &c., at the Winter Show, Palmerston North.

Wairarapa.

Ballance.—Debate "That Jersey Cows are Better than other Breeds." I. Bremner led for the affirmative and R. Day for the negative, there being five speakers on each side. Mr. C. H. Wilton acted as judge, and awarded the decision to the negative side. At the previous

meeting Mr. A. W. Hudson, of Massey College, gave a lantern lecture on "Pastures and Top-dressing."

Carterton.—Discussion on the live-stock embargo, Speakers: W. Campin, B. Brassell, S. Fisher, and J. E. Allen.

Eketahuna.—Lantern lecture by Mr. N. Lamont, Department of Agriculture, on "Grass-seed Certification."

Featherston.—Discussion on proposed tour; arrangements for debate with Martinborough Club.

Greytown.—Address by Mr. G. Maloney on the education required by farmer.

Martinborough. — Arrangements for annual ball. Talks by club members as follows: "How to Keep up Milk-production" (Craig); "Management of Hoggets" (I. Nicol); "Foot-rotting and Design of Sheep-yards" (N. Martin); "Lucerne Hay" (Mr. Herrick).

Masterton. — Final arrangements for dance. Selection of a team for inter-club judging competition. Acceptance of debate with Tinui Y.F.C., subject to be "That Heredity has a Greater Influence than Environment." Address by Mr. C. Dickie, Department of Agriculture, on "The Duties of a Farm Dairy Instructor."

Tinui.—Arrangements for a dance and also for a field-day. A practice debate was held between three members selected to debate with Masterton Y.F.C. and three other club members—subject, "That Heredity has a Greater Influence than Environment."

Wanganui.

Bulls.—Arrangements for annual dance. Address by Mr. C. J. Hamblyn, Department of Agriculture, on the Y.F.C. organization; Mr. Dingwall, Department of Agriculture, also spoke.

Taihape.—Informal talk by Mr. Dingwall, Department of Agriculture, on the Y.F.C. organization, &c.

Waimarino.—Field-day at the State Forest, Karioi; Mr. Kendadine demonstrated on the growth and care of shelter and timber trees. Eighteen club members attended.

Westmere.—Talk by Mr. T. W. Lonsdale, Department of Agriculture, on the benefits to be obtained from the Y.F.C. organization. This is a newly-formed club, with a membership of thirty-five already.

Taranaki.

Alton. — Discussion of report and balance-sheet of club's annual sports and dance. Arrangements for annual meeting.

Pukengahu.—Discussion of Y.F.C. constitution. Members who had taken part in the recent South Island tour gave a brief summary of their impressions after the chairman had outlined the tour.

Toko.—Final arrangements for dance. J. Stallard, H. Ancell, J. Lister, H. Milne, G. Anderson, and L. Kilsby gave descriptions of the many points of interest in connection with the recent South Island tour.

Whenuakura.—Lecture by Mr. H. G. Dickie, M.P., on "The History of the Meat Industry in New Zealand." At the previous meeting Mr. P. J. Oakley gave an address on "Fertilizers of To-day."

Southern Hawke's Bay.

Dannevirke.—Address by Mr. E. N. Hogben, Principal of the Dannevirke High School, on "The World in Turmoil." At the previous meeting Mr. J. W. Palmer, Department of Agriculture, gave a lantern lecture on "Subterranean Clover."

Norsewood.—Talk by Mr. J. W. Palmer, Department of Agriculture, on the running of the club and Y.F.C. activities generally.

Northern Hawke's Bay.

Meeanee.—Lecture by Mr. N. J. Adamson, Department of Agriculture, on "Local Standardization of Fruit." This very interesting and instructive address was given for the benefit of orchardist members, and was very much appreciated. The various gradings and percentages of skin blemishes were demonstrated by means of specimen fruit. At the previous meeting a lecture was given by Mr. A. D. M. G. Laing, Government Veterinarian, on "Diseases and Ailments of the Dairy Cow," dealing with milk fever, normal and abnormal calving, post-partem paralysis, abortion and sterility, mastitis, tuberculosis, and actinomycosis. The speaker concluded with a demonstration of the testing of milk for chronic mastitis, a very simple but definite test of great value to dairy-farmers.

Nuhaka.—Lecture by Mr. A. D. M. G. Laing, Government Veterinarian, on "Facial Eczema in Sheep." At the previous meeting an impromptu speech competition was held for a prize donated by Mr. W. Walker. This was keenly contested, the winners being as follows: First, J. G. McIntyre ("Eradication of Noxious Weeds"); second, G. Shaw ("The Benefit of Stock in Maintaining Good Pastures"); third, N. Alexander ("How to Build up a Good Dairy Herd"). Messrs. G. Goddard and J. Small acted as judges.

Wairoa.—Mr. R. E. R. Grimmett, Mr. Filmer, and Mr. Haugh lectured on "Cobalt." Mr. Grimmett spoke on soil composition and the uses, &c., of the various components; Mr. Filmer spoke on the way in which the value of cobalt in connection with stock was discovered, and outlined the stages in experimental work that had been carried out in Australia; Mr. Haugh explained the experiments that were being carried out in Poverty Bay. At the previous meeting Mr. A. D. M. G. Laing, Government Veterinarian, gave a lecture on "Facial Eczema in Sheep."

Poverty Bay.

Tolaga Bay.—*Résumé* of the club's activities for the season, by L. Donald, and a talk on "The Harvesting and Storing of Mangels," by D. Jones.

Waiapu.—Lecture by Mr. Pierson on "The Rearing and Care of Pigs."

Bay of Plenty.

Waihi.—New club, with particularly good prospects; initial membership fourteen.

Waimana.—Debate between Waimana and Edgecumbe Clubs; subject, "That Tours of Other Districts are of more Educational Value than Organized Farm Schools." Waimana (affirmative) won by 81 points to 72. A field-day was held at Nukuhou, which took the form of a demonstration of an electric fence.

Te Kuiti.

Aria.—Discussion and arrangements for field-day and dance.

Otorohanga.—Field-days as follows: At Te Awamutu, "Pig-breeding and Management" (Mr. Webber); "Making of Dried Skim-milk" (Mr. H. E. Roberts); Mr. G. D. Hall's farm, Otorohanga, "Large Black Pigs" (Mr. G. D. Hall); "Brom Thymol Blue Test for Mammitis" (Mr. Melrose). A combined field-day was also held in conjunction with the Te Anga Club on Messrs. Tynan's property, Te Anga; demonstrations were given by Mr. D. Tynan as follows: Romney sheep, Polled Hereford cattle, and "Points in Successful Farming."

Rotorua.

Rotorua-Ngongotaha.—Field-day held on the properties of Messrs. G. Kent and K. Martin, Ngongotaha. Demonstrations were as follows: "Foot-rot in Sheep"—trimming of feet and curative methods (Mr. C. H. Newson, Inspector of Stock); "Farming Methods and Butter-fat-production" (Mr. K. Martin); "Management of Breeding-ewes on a Dairy-farm"; and "Selection of Ewes for Breeding" (Mr. H. M. Martin). This is a new club with a membership of over twenty to date.

Waikato.

Matangi.—Discussion on programme for the coming season.

Te Kowhai.—Field-day at the Ruakura Experimental Farm. A number of farmer friends accompanied club members, the total attendance being thirty-eight. Demonstrations included the following:

" Establishment of Paspalum, Rye-grass, and White Clover Pastures " (Mr. W. T. Brown); " Use of Super, Lime, and Potash on Established Pastures " (Mr. A. C. Burgess); " Experiments in Bull Fertility " (Mr. T. E. Rodda); " Pigs " (Mr. C. E. Ballinger). This is another newly-formed club with a membership of twenty-one.

North Auckland.

Marohemo-Maungaturoto.—A field-day was held, taking the form of a day's tour in the Northern Wairoa district. The attendance was twenty-two, comprising seventeen club members and five farmer friends. The visitors were conducted by Mr. D. Marra over his 50-acre farm, on which he averages 300 lb. of butterfat per acre and winters all his live-stock. The Northern Wairoa Experimental Farm at Dargaville was visited, and the work there explained by Mr. E. H. Arnold, Department of Agriculture. A demonstration was given of an electric fence, and a visit was paid to Mr. Edmiston's property on the Bayly Estate. Considerable interest was displayed in the coastal belt conditions, several of the visitors suggesting that the soil-type and climate should be suited to early fat-lamb production.

Matauru.—Field-day at Mr. Stevens' property, Maungataupere. Demonstrations included " Jersey Cows " (Mr. Moreland), and " Diseases in Cattle " (Mr. T. H. Hankin, Government Veterinarian). A judging competition was also held on the dairy cows. A new club with good prospects.

Pohangina Valley Club's Field-day.

THE Pohangina Y.F.C. held a field-day in Palmerston North on 21st March. Approximately thirty members attended, and they were met at the Seed-testing Station by Mr. A. J. Galpin, who introduced them to Mr. N. R. Foy.

The party was keenly interested in the work carried out at the Station, special notice being taken in the ultra-violet-light test for the certification of commercial rye-grass and the picric-acid test for white-clover certification. Methods and technique in finding the purity and germination of seed samples was also explained.

In the afternoon the party were shown around the grass and clover plots at the Grasslands Division's experimental area at Massey College. Mr. E. Bruce Levy gave a short talk on some of his impressions of agriculture abroad, especially in relation to the value of New Zealand strains of rye-grass and white clover. Mr. L. Gorman discussed methods of selection and breeding in pasture plants, and members were shown the areas of rye-grass and white clover from which the pedigree strains have been developed.

The day concluded with a vote of thanks proposed by Mr. H. M. Linklater to Mr. Levy and Mr. Gorman.

Pohangina Club's field-day at the Plant Research Station, Palmerston North: Mr. E. Bruce Levy demonstrating on rye-grass strains.

Y.F.C. Radio Broadcasts.

A Young Farmers' Clubs' session has been in operation regularly every Friday fortnight at 7.40 p.m. from 2YA for more than twelve months. The following is a list of some of the more recent broadcasts :—

Friday, 25th March : Messrs. K. Donovan, J. F. McLaren, G. Hunt (members of the Masterton Club) and N. Lamont (Wairarapa District Secretary), " The Establishment of Permanent Pasture."

Friday, 8th April : Messrs. L. Mee, J. Lancaster, R. Spooner, and R. Curran (members of the Tinui Club), a debate, the subject being " That the Young Farmer of To-day has Equal or Better Opportunities than his Grandfather."

Friday, 22nd April : Messrs. A. Stuart (Secretary, Bunnythorpe Club), and A. J. Galpin (Department of Agriculture, Palmerston North), " Mole-draining."

Friday, 6th May : Messrs. S. Freeman (Organizing Secretary) and G. S. Robinson (Manawatu District Secretary), " Young Farmers' Club Activities."

The following talks from 2YA have been arranged :—

Friday, 20th May : Mr. A. Mikkelsen (Kairanga Club), " Animal Diseases."

Friday, 3rd June : Mr. A. McDonald (Pohangina Valley Club), " Hill-country Management."

Y.F.C. broadcasts are also conducted monthly from 3YA, Christchurch, and 4YA, Dunedin, and irregularly from 1YA, Auckland.

Annual Meetings.

REPORTS of annual meetings of clubs have been received during the past six weeks, and by the time this *Journal* is published they will all be over. The annual district meetings are also being held. One of their functions under the new constitution is to elect the District Executive Committee, which in turn selects delegates to the four Councils.

The North Island Council held its final meeting at Palmerston North on Friday, 8th April. The Council was formally dissolved, and the Emergency Committee left to hold office until the two new Councils for the North Island meet under the new constitution for the first time. These meetings will take place during June.

The final meeting of the South Island Council is to be held at Dunedin on Friday, 13th May. It is anticipated that the annual meeting of the Federation will be held in Christchurch about the middle of July.

Health Notes for the Farm.

Contributed by the Department of Health.

Importance of Hygiene.

Risks to Gardeners and Market Gardeners.

OCCUPATIONAL hygiene has in recent years come to assume an important place both in medicine and in industry. Its object is to protect the health of those engaged in various occupations ranging from the miner to the gardener. Every occupation more or less involves certain risks to health, and it is essential that these should be recognized in the interest of the individual and the State.

The following excerpt from an article published in "Occupation and Health," issued by the Labour Office, Geneva, contains information and advice which is considered may be of value to those engaged in the gardening industry and to gardeners generally. Many of the conditions given may not be applicable to New Zealand, and some of the ill effects enumerated may arise from the fact that there are individuals constitutionally susceptible to such when handling certain plants, &c. Such idiosyncrasies are by no means confined to those who follow gardening; many persons are susceptible to some particular article of diet.

The list is very long. The fault is clearly not in the food, but in the person. Generally speaking, however, gardening occupations are healthy if the person engaged takes adequate precautions, is physically suitable for the work, and observes a high standard of hygienic living.

Trying Conditions.

The working-conditions of gardeners are, to a certain extent, more trying than those of agricultural labourers. The work, in fact, is carried on throughout almost the whole winter without interruption during bad weather or fog. The occupation of gardener demands quick intelligence, skill, and a highly developed artistic sense. It is a great mistake to choose for this occupation young persons with weak lungs or those suffering from cardiac or kidney disease.

Gardeners are exposed to heat-stroke as well as to the effects of all kinds of inclement weather. Often they work during long hours without being able to change their wet clothes, which predisposes them to respiratory diseases and affections due to cold. In winter gardeners suffer from sudden changes of temperature (sudden passage from 28° C. of heat in hothouses to the outdoor cold).

Work in a kneeling position for planting, uprooting of weeds, and pruning gives rise to localized forms of rheumatism, especially in the knees. Cress, which is cultivated in small artificial canals, is difficult to gather. The gardener works on a small bench placed across the canal, and is obliged to remain for a long time in a trying position when engaged in this operation.

Exposed to Injuries.

Gardeners are also exposed to injuries, which are often serious and sometimes even fatal, due to stings and bites of insects—mosquitoes, wasps, bees, &c. Workers engaged in sorting and cleaning seeds are exposed to dust inhalation, although it must be remembered that this work only lasts for some weeks during the year.

The pollen of certain plants causes hay fever, characterized by irritation of the ocular and nasal mucous membrane, and sometimes by asthma. The handling of manure—among the least harmful kinds of which is horse and cow dung, but which also consists at times of night soil—may constitute a cause of various types of infection, such as typhoid fever and dysentery. Tetanus is easily contracted, as the germ of this disease inhabits the soil, and gardeners often contract the bad habit of applying earth to their wounds in order to stop bleeding.

In certain countries ankylostomiasis is of very frequent occurrence among gardeners, and especially amongst market gardeners. A high incidence of helminthiasis has also been reported (oxyuris, tænia). Cases of actynomicosis, aspergillosis, and sporotrichosis have been reported among gardeners handling contaminated plants.

During the period 1920–1925 Foerster (United States) noted fourteen cases of sporotrichosis among gardeners engaged in nurseries. Efforts succeeded in isolating the sporotrix on the bark and thorns of bushes of barberry. Out of 145 cases of sporotrichosis reported in the United States, 17 affected gardeners. Other cases have been reported, particularly in France.

Poison from Plants.

There are many plants which are capable of setting up localized dermatitis, in general on the hands, forearms, and face. All parts of the plant are not equally dangerous. The nettle, for instance, causes a mechanical injury by small hairs which become detached from the plant and constitute small needles, which serve to inject the poison into the skin. The time of the day and amount of humidity may in certain cases exercise an influence. Thus the parsnip may be more harmful at the moment when it is covered with morning dew.

The time of incubation varies from some hours to several days. As an example, the Japanese primrose (*Primula obconica*) was imported from China to the United States in 1882, and the first case observed was that of a florist who suffered from its effects in two consecutive years at the same time of the

year. Certain persons are so sensitive that the least contact with the hairy parts of the plant suffices to provoke eczematous dermatitis. According to certain authors, it is the crystals of oxalate of calcium contained in the plant which act as a means of conveying the poison, while others consider that the crystals themselves are precisely the cause of the dermatitis. According to one authority, 30 per cent. of the gardeners who cultivate this plant are affected by it.

Other plants are at times the cause of dermatitis and conjunctivitis among gardeners—the "sumac" (*Rhus toxicodendron*), the resin of which contains a poisonous product giving rise to forms of dermatitis midway between eczema and erysipelas; mezereon (bois gentil, bark of *Daphne mezereum*), celandine, bulbs of hyacinths and tulips; the *Ampelopsis quinquifolia*, which causes, especially in autumn, violent irritation of the skin localized in the hands, the face, and the back of the neck; arnica, vanilla, geranium; asparagus; virginia creeper; the *Arundo donax;* the "may weed"; celery; (erythemato-bulbous dermatitis of the hands and forearms when in direct contact with the juice of celery; relapse on resumption of work); the lemon and the orange. Finally, the dust of cereals provokes a kind of urticaria of a papulous type on the parts exposed, often intensified by exposure to light.

Infection from Tulip Bulbs.

In 1926 it was reported in Jersey and the Scilly Isles that people handling narcissus, hyacinths, wild daffodils, and tulips were suffering from dermatitis. An inquiry made in the two largest establishments exporting the bulbs of these flowers resulted in the discovery that a small percentage of the sorters and packers were suffering from painful lesions with desquamation of the skin localized entirely under the nails (peri- and hypo-nychium, without the substance of the nails being affected). The dermatitis appeared after some days of work and was attributed to the tulip bulbs. Injuries caused by narcissus bulbs attacked the phalanges of the fingers, the skin of which came away in scales on the slightest rubbing. It was noted that those persons who had the longest nails were the most severely affected.

Irritation of the skin may also be caused by mites (Acarus) which live on certain plants, such as green gooseberries, during certain months. On the other hand, gardeners who remove the cocoons from night moths (*Uproctis chrysorrhoea*) from trees have been known to suffer from dermatitis and erythematous patches, or patches of urticaria, characterized by itch, which is sometimes very violent.

Danger of Infected Wounds.

Scratches and small wounds caused by thorns may give rise to inflammation of the cellular tissue and, where suppuration follows, cause boils and whitlows. According to certain statistics, 11 per cent. of the cases of sickness among gardeners were due to infected wounds. There must not be omitted also the mention of debris of plants, which, together with earth and moulds, may lodge in the worker's hair and under his nails and finally give rise to phenomena of irritation.

The handling of hyacinth bulbs may also cause conjunctivitis attributed to the crystals of oxalate of calcium contained in the bulb of this plant. On the other hand, a serious form of conjunctivitis (*Ophthalmia nodosa*) may be caused by the hairs of caterpillars. In certain cases these hairs, which are very fine, penetrate into the cornea of the iris and there cause lesions of such a serious order that they may sometimes result in blindness.

Handling of Mixtures.

For some years back ether has been used to accelerate the early blossoming of flowers. It is therefore necessary to take into account the risk involved by the handling of this dangerous product.

Pulverization of arsenate of lead, Paris green, and sulphate of lead as insecticides has sometimes caused cases of poisoning. For some time back there has been used, especially in Germany, powdered products based on mercury and arsenic compound, the handling of which demands the greatest care.

The use of powdered sulphate of lead, which is very extensive in the United States, is not permitted in Germany because of its toxicity. Finally, there should be mentioned the risk of accident, particularly during work in nurseries.

Hygiene.

Catching cold should be avoided as far as possible by wearing clothes adapted to the climate and the seasons. Working barefooted should be prohibited. Effective protection for the worker and the use of suitable apparatus in the case of handling anti-parasitic toxic products is recommended. Individual cleanliness, especially the hands, adequate installations enabling the gardeners to cleanse their hands from soiling with manure and disinfectant products should be provided. Prompt disinfection (with tincture of iodine) and application of an antiseptic dressing are to be recommended in all cases of wounds and even superficial pricks. Persons called upon to handle hyacinth and tulip bulbs should cut their nails as short as possible and rub their fingers with a piece of common soap before commencing work. The wearing of gloves and finger-stalls is also to be recommended.

How Busy People Can Keep Well.

KEEPING well is largely a matter of following a few of Nature's simple rules. Careful observance of these rules soon changes them into habits, and they then take care of themselves without further conscious effort.

Nutrition.—Have a variety in your diet. Fruit and vegetables are aids to general health. Eat slowly and not too much.

Purification.—Cleanliness both outside and inside promotes health. Drink plenty of water. It has been well said that "a glass of water a day keeps many an illness away." Always wash the hands before meals. Bathe frequently. Keep the teeth clean.

Ventilation.—Sunshine and fresh air are Nature's best tonics. Be out of doors all you can during the day, and ventilate your bedroom at night.

Animation.—Lack of reasonable activity leads to stagnation. Walk often. Take exercise night and morning suitable to your age, weight, occupation, and physical condition.

Protection.—Use judgment in protecting yourself and others from infection. Cover coughs and sneezes. Avoid crowds when colds and influenza are prevalent.

Agitation.—Your mind reacts on your body. A famous physician states that health is seriously endangered and illness definitely encouraged in the person who gives way to hate, worry, fear, and envy. A merry heart goes a long way. An interest in something apart from one's work helps to soften the effects of life's troubles.

Complication. — When you are sick obtain medical advice.

Prevention.—Visit the dentist occasionally, and have your body medically examined periodically, particularly after middle life. Avoid being an extremist in personal health matters. Moderation brings good results.

Special Potato Supplement.

Seed-Potato Certification.

Basis of Classification of Crops.

J. H. Claridge, Seed Certification Officer.

FOR the past ten years during which the certification of seed potatoes has been undertaken by the Department of Agriculture the aim has always been the identification of those crops which are pure and true to variety and which, by virtue of their freedom from virus and other " degeneration " diseases, are capable of producing the highest possible yield under any particular set of conditions.

In review one realizes that considerable development has taken place in our knowledge of potato diseases through these years, with a resultant improvement in the technique used in classifying the crops entered for certification. While it would be unwise to suggest that we have reached the end of any development in this direction, one feels that, with the consolidation of ideas that has now taken place, the time is opportune for an explanation of the methods at present employed in deciding the classification of the various crops under consideration.

Classification.

Classification according to varietal purity is comparatively straightforward and might first be considered. The percentage of foreign varieties is determined at time of field inspection. All crops containing 2 per cent. or more of foreign varieties are rejected from certification irrespective of any other virtues these crops might possess. In addition, crops containing more than 1 per cent. of foreign varieties are not entertained in the "mother" class but are placed in the " commercial " class. Thirdly, any crop containing more than an occasional plant of another variety is not permitted classification in the highest group of the particular variety, but is placed in a lower group. All crops entered for certification are inspected and classified along the above lines.

Classification according to freedom from virus and other " degeneration " diseases is not so straightforward. The following factors, with perhaps others, all bear an influence on the rapidity of spread of these diseases and are accordingly taken into account: Percentage of diseased plants showing in both the sample trial and the farmer's crop; intensity of any rogueing undertaken to remove diseased plants; size of seed planted; degree of isolation of farmer's crop from potatoes of another variety; and locality in which crop is grown.

Factors Explained.

An explanation of these factors might be considered. In the sample trial plots samples of each crop in certification are being grown side by side under uniform and as nearly as possible ideal conditions so that comparisons between the various samples might be made. These trials are of extreme value, for the reason that growers' crops are grown under a range of conditions and cannot always be inspected under the most favourable circumstances. Associated with the inspection of these plots is the field inspection of the growing crops themselves. These inspections permit those concerned to draw comparisions with the grower's own crop and the corresponding sample in the trial plots, and through this to other crops grown under different conditions. At time of field inspection a determination is made of the degree of rogueing which has been done. When a farmer rogues his crop for virus disease he does not receive full credit for all the disease he might remove. The transference of the disease from diseased to healthy plants may have taken place prior to rogueing, thus making a full allowance impossible. This transference is more likely to take place where the removal of plants is done late in the season. The allowance to the grower for any rogueing done is equal to approximately half the diseased plants removed, the grower reaping the full benefit of his efforts in the following season.

Size of Seed.

Particulars as to size of seed planted are recorded as completely as possible, this information often throwing light on otherwise unexplainable variations in lines of seed of the same origin. For

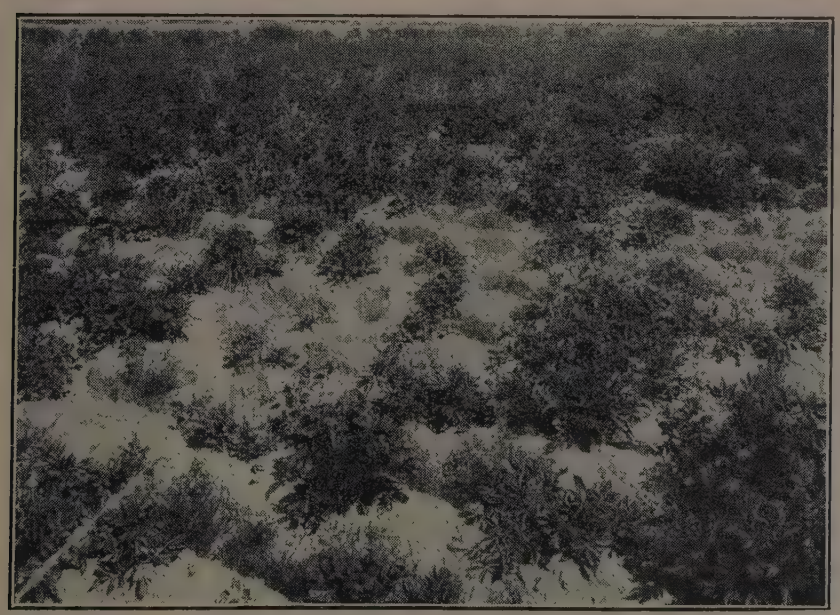


Fig. 1.—An extreme result from the use of uncertified seed, showing the effects of using seed potatoes badly infected with virus diseases. Note the large proportion of blanks and weak plants and the resultant development of weed growth. Compare with Fig. 2.

[J. H. Claridge, photo.

instance, it is generally agreed that the smaller the seed planted the greater the tendency for a higher percentage of diseased plants to be shown in the resultant crop. Quoting an actual instance in three crops planted with seed of the same origin, seed under 2 oz. in size showed 7·5 per cent. disease, seed between 2 oz. and 4 oz. in size showed 6·2 per cent. disease, while seed over 4 oz. in size showed 5·7 per cent. disease. Such differences are not exhibited in every case, but such is the general trend. For this reason the Department will not recognize for final certification any tubers smaller than 2 oz. in size.

In the earlier years of certification the degree of isolation existing between different varieties in the field and its relationship to the development of virus diseases was not appreciated, and instances of unaccountable collapse of a crop with virus disease were experienced. Research has since shown, however, that certain varieties might carry a virus disease without exhibiting any symptoms of the disease—masked virus—but when the virus is transmitted to a plant of another variety that plant succumbs to a very virulent condition of the disease. Unfortunately, this condition does not exhibit itself until the following season.

It has now been deemed expedient to insist upon the isolation of a crop by at least 5 yards from any crop of another variety before recognition in the "mother" class can be given. This restriction does not refer to isolation from other crops of the same variety, nor is it applicable in the meantime to crops which in any case would only be classified as "commercial."

Fig. 3.—Variations in yield which have been obtained from one hundred tubers selected from different lines of the same variety and grown together under uniform conditions. The outside sacks typify the yield from certified seed, the inside sacks the yield in extreme cases from uncertified seed. The figures represent tons of table potatoes per acre.

[J. H. Claridge, photo.

Locality Factor.

Locality in relation to the certification of seed potatoes plays an important part to-day. It has been found insufficient to determine the value of a particular crop as it grows and leave the matter at that. It is now commonly known that virus diseases are carried over from year to year in the tubers, that they are spread from plant to plant in the field by aphides, and that a plant infected with virus by the agency of these insects does not show immediate characteristic symptoms, these only revealing themselves when the produce of the plant has been grown. Thus in the early seasons of certification, before locality was taken into consideration, it not infrequently occurred that a crop which was up to certification standard in one season produced tubers which when planted in the following season developed into a crop well below certification standard. This did not concern directly the grower of the certified crop, but it did affect very directly the grower of the crop produced from certified seed. Put in another way, the evaluation of the crop under certification was an expression of the condition of the crop itself and not of the seed which would be certified to produce a crop the following season.

Fig. 2.—A typical example from the results to be expected from the use of certified seed, showing strong vigorous growth and freedom from weak plants and "misses." Weed growth, also, has been controlled by the growth of foliage. Compare with Fig. 1.

[J. H. Claridge, photo.

Part Played by Locality.

Fortunately, it was able to be shown that locality played a large part in the solution of this problem. It was shown, for instance, that where the locality was such as to favour the production of low to medium yields and was unsuitable to a high infestation of aphides the spread of virus in the field was negligible compared with that occurring where high yields associated with high aphis infestation were experienced. Typical examples of these districts are the foothills of Canterbury and parts of Southland on the one hand, and the heavy potato lands of South and North Canterbury on the other.

With the inspection of thousands of crops in the course of seed-potato-certification operations it has been found possible to determine fairly accurately the relative values of the different localities in this respect. The application of this knowledge has made it possible to forecast in some degree the quality of the seed which will be produced from the crop under inspection. In other words, it is now possible to give to the purchaser

of certified seed some assurance as to the quality from a virus disease aspect of his resultant crop. Thus the information to be gleaned from the locality in which the crop was grown has been of inestimable value in determining the classification of the crops entered for certification.

Classification of those crops accepted for certification are made under two main heads—" mother " and " commercial "—subdivided into a number of groups. All the points aforementioned are of the utmost importance in classifying a crop as " mother," where the use of the crop for further multiplication and seed-production is intended, but of lesser importance in the classification of a crop as " commercial," the seed from such crops being intended to be used for the production of crops for table purposes only.

Fig. 4.—From left to right the plants shown are: (a) Healthy growth; (b) infection with mosaic disease; (c) healthy growth; (d) infection with leaf roll disease; (e) healthy growth. Certification aims at the identification and distribution for seed purposes of these crops showing a minimum percentage of plants affected with virus diseases such as leaf roll and mosaic.

[J. H. Claridge, photo.

Percentage of Virus.

It should be borne in mind that the percentage of virus disease allowable in a crop entered for certification is not fixed, but varies from variety to variety. Similarly, the standard within a variety may vary from season to season, generally showing a tendency to harden as more crops of a higher standard become available.

Accompanying this statement is a list of growers whose crops have passed the field inspection associated with the certification of seed potatoes during the season 1937–38, and which have accordingly been recommended as " provisionally certified." The meaning of this term is explained in a foreword to the list, while a summary of the various steps taken in arriving at the classification of these crops is given below :—

(1) Samples from each line entered for certification are grown out in the trial plots.

(2) The trial plots and the farmer's own crop are both inspected during the season, to determine the percentage of foreign varieties and of virus and other " degeneration " diseases which might be present.

(3) A preliminary classification of the crop is made according to the percentage of foreign varieties present.

(4) From an analysis of the disease present in both sample trial and field a " disease figure " is given to each crop.

(5) From an examination of all the disease figures of one variety approximate standards for " mother " and " commercial " seed are set up.

(6) The disease figure of each crop is examined in relation to other crops of the same origin taking into account any rogueing which might have been done, and its grouping within the standards set is made, or its rejection determined.

(7) The grouping of each crop is re-examined in relation to the isolation of the crop, to the locality in which it is being grown, and to any other factors which may have an influence in regard to the seed produced and to the resultant crop, and any necessary adjustments made.

(8) The crops accepted as provisionally certified are tabulated as in the accompanying list, giving, in addition to the grower's name and address, the grouping of the particular crop, the percentage of foreign varieties recorded at field inspection, and the acreage.

Maintenance of Standard.

In general, in the highest group of any variety are included only those crops which it is considered are of the best possible standard in regard to the seed produced therefrom in its ability to reproduce crops of a like high standard. Further, in the " mother " class are included those crops of the requisite standard which it is expected will produce crops capable of qualifying for certification in the following season. In the " commercial " class are included those crops of a lower standard than that demanded for " mother " seed and also those crops of " mother " standard but which it is considered are growing under conditions mitigating against requalification under the certification scheme in the following season. Nevertheless, such seed is quite suitable for the grower who intends to grow a crop of table potatoes and dispose of all his produce.

The certification scheme and the method of classification is not simple nor is it infallible. Its effectiveness may be judged, however, from the following facts :—

(1) Three Dakota crops were certified in the highest group in the 1936–37 season. The produce of these crops was responsible for twenty-six out of the thirty-three best crops inspected during 1937–38, while five further crops were the once-grown produce of one of these crops from the 1935–36 season. Only two crops out of thirty-three came in the past two seasons from an origin other than the three best crops of 1936–37.

(2) Of nearly four hundred crops of Aucklander Short Top entered for certification in 1937–38 and planted with " mother " seed only three—less than 1 per cent.—failed to reach the degree of freedom in regard to virus infection which was demanded of this season's crops under certification.

(3) For the seasons 1935–36 and 1936–37 (the only seasons in which suitable returns have been obtained) the Government Statistician has calculated that over the whole of New Zealand areas planted with certified seed have given a 25 per cent. better yield than areas planted with uncertified seed.

Thus might be justified the three features—the extremely high quality of crops passed in the highest group, the general high standard of all crops certified in the " mother " class, and the value to the farming community of certified seed potatoes.

Treatment of Seed-Potato Diseases.

A. STUART, Instructor in Agriculture, Invercargill.

SEVERAL Southland potato-growers have for some years treated their seed potatoes with acidulated corrosive sublimate both for powdery scab and corticium disease. Not only are these diseases fairly well controlled with this treatment, but blight spores which may be on the skin of healthy tubers are also killed.

Powdery scab, which must not be confused with common scab, is influenced by soil and climatic conditions, often being severe in cool districts. It will not appear in a crop unless the soil or the seed potatoes planted are affected with the powdery-scab organism. Once introduced into soil, it may remain for some years and be a source of danger to the clean seed planted. Both these scabs spoil the appearance of a line of potatoes and lessen their market value.

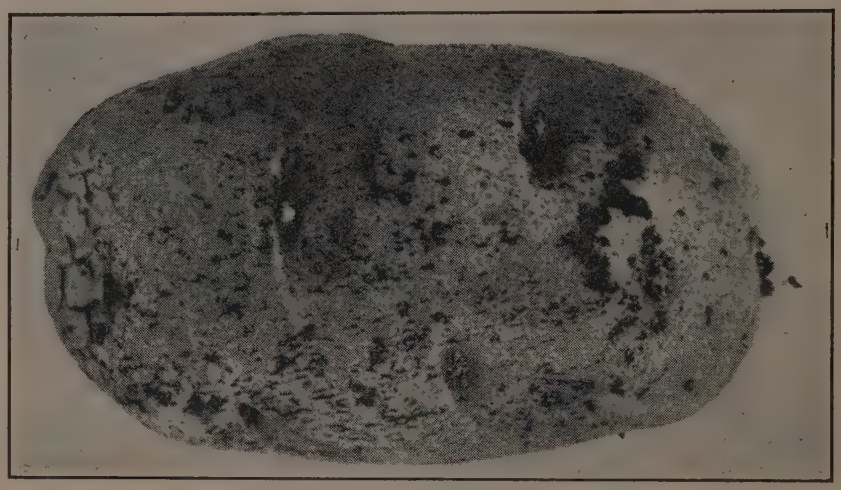


Fig. 2.—Corticium disease in a potato.

Corticium occurs on the tubers in the form of black sooty lumps or specks, the infection varying. These lumps cannot be removed by washing, but can be removed by the finger-nail, leaving the skin of the tuber intact. Corticium, when planted with the tuber, will attack the young growing shoots. Secondary eyes will then develop, rendering the plant late and producing a large number of shoots. The yield is affected, and, as a rule, few table potatoes are produced from such a plant.

Seed is treated soon after grading. The procedure is to dissolve 8 oz. of corrosive sublimate in 2½ pints of commercial hydrochloric acid and then to add the solution to 50 gallons of water, the mixture being well stirred. The potatoes are then steeped in this mixture for one hour and a half, and should be thoroughly dried before rebagging in clean bags.

A wooden trough is required to hold the mixture, as the solution will attack metal or concrete. For holding the tubers during immersion, wooden containers made of light timber and widely spaced are an advantage.

A good method of drying is to suspend a length of bird netting in the open air in the form of a long table. The air will then circulate freely and the tubers will dry rapidly.

If bagged while wet, the tubers showing powdery-scab ruptures will rot. Bags should not be immersed in the solution, as the sacking is also attacked by the mixture, which can be used three times before being discarded. The potatoes should be treated before sprouting in order to avoid injury in handling.

Fig. 1.—Potato affected with powdery scab.

[Photos by H. Drake.

Tasmanian Potato.

A FARMER in the Aparima district, Southland, received three 2 oz. seed potatoes during last November from a friend in Tasmania. The seed were of the Brownell's Beauty variety, and when sown were cut to give seven seeds. The resultant crop dug in early April revealed a beautifully fleshed crop of potatoes of a good, even, large size.

The total yield from the three seeds weighed 34 lb., and an instructor counted fifty-five tubers all of at least 3 oz. in weight, while there were about two dozen tubers of the size of a large bean from the seven shaws.

—W. L. Harbond, Instructor in Agriculture, Invercargill.

Manuring of Potatoes.

A. S. Nash, Instructor in Agriculture, Rangiora.

During the past thirteen years manurial experiments carried out by the Fields Division over a wide range of soil types have proved conclusively that manuring of potatoes definitely pays.

On light to medium soils 4 cwt. of the mixture superphosphate 3 parts, sulphate of ammonia 1 part, gives the best return, while on the richer alluvial soils heavier

Fig. 1.—Moulder used for manuring potatoes.

applications up to 5 cwt. per acre can be used profitably. The farming community as a whole has adopted a manurial practice on the lines recommended, and it is rarely now that one finds a potato-grower who does not fertilize his crop.

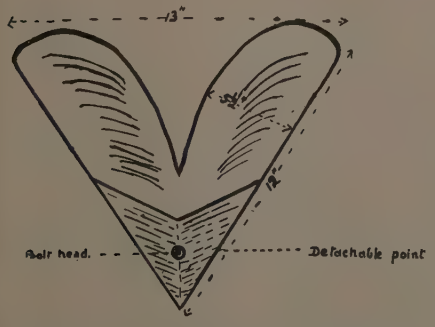


Fig. 2.—Dimensions of moulder.

Fig. 3.—Drill fitted with moulders.

Application of Manure.

There are various methods of applying the manure, and potato-planters are not as common as one would expect. Ploughing in is still largely practised, and has to be resorted to when large seed is planted. Manure-boxes can be obtained to fit on to the back of the plough, but there are still many growers of potatoes who apply manure by hand either in the furrow or on the ridges just when the potatoes appear. Under South Island conditions especially the manure needs to be placed close to the seeds so as to give them that initial stimulus which is so important to good development.

Practically every South Island farmer owns a grain-drill, and the accompanying photograph shows one fitted with special coulter tips so that it can be used to open up drills and apply manure. These moulders have been used successfully by a Swannanoa farmer for the past two seasons, the advantage being that the manure is put on exactly and evenly and four drills are opened up at once.

Predrilling manure through every coulter is sometimes practised, but the manure is put on top of the ground and part of it is too far away from the sets to ever be used. In fact, 4 cwt. of super predrilled on the surface is equal to approximately 3 cwt. alongside the tubers. With a drill fitted up in such a manner it is possible to open up 10 acres a day, whereas a planter averages about 3 acres.

Loose Soil Desirable.

In order to enable the moulders to penetrate, the ground must be well loosened beforehand with a stiff tine cultivator. Using a fifteen-coulter drill, the moulders are attached to the front coulters and the manure tubes grouped in threes. The fourth manure spout is blocked, so that the drills are 28 in. apart and the driving is wheel on wheel. The manure goes well down into the furrow and is mixed up with the soil, so that there is no danger of burning the young shoots. Weights attached to the back of the coulters aid penetration, and on some drills extra tension can be applied to the springs by inserting a washer.

On stiff soils it is quite likely that difficulty may be experienced in making the drills sufficiently deep and it may be necessary to follow with a mould plough. Even if this is necessary, farmers should find a drill used in such a manner a quicker and better method than applying manure by hand. The moulders are fitted with a point and they bolt on to the coulters. Sizes are given in accompanying sketch, and they can be made by any blacksmith at a small cost. A fifteen-coulter drill is best, as it allows driving wheel on wheel, while a thirteen-coulter opens up only three drills, and it is necessary to overlap to wheel to get correct spacing.

Final splitting of the moulds to cover the sets has to be carried out with the ordinary moulder.

Method of Certification.

Provisional Certificates for Season 1937-38.

FIELDS DIVISION.

PROVISIONAL certificates are issued with the object of affording growers some indication of the general standard of their crops and assisting them in the disposal of their seed. Certification tags to be attached to the sacks are issued later, provided that an officer of the Department of Agriculture inspects the graded seed potatoes and is satisfied that they are still of the same standard of purity and freedom from disease as was indicated by the field inspection.

Each crop has received a group-number, which indicates as accurately as possible the merits of its produce for seed purposes in relation to the merits of the produce of the other provisionally certified crops of the same variety. Group 1 is the highest and Group 9 the lowest. The difference between any two consecutive groups is small, and in making comparisons the cost of seed and transport should receive consideration.

Crops are also divided into two classes—namely (1) certified "mother" seed; (2) certified "commercial" seed. Areas sown with certified mother seed are eligible for entry into certification. Areas sown with certified commercial seed are not eligible for entry into certification, except in the case where the seed planted has been raised by the entrant (grower) himself. Growers who intend to purchase seed with the object of entering certification must therefore purchase certified mother seed.

LIST OF GROWERS.

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top.			
Mother Seed (North Island)—			
Deadman, G. T., Ohakune	2	..	12
Faull and May, Raetihi	2	..	11
Fetzer, E. L., Ohakune	3	..	3
Foster, E. H., Ohakune	3	..	2
Hing Yoi, Ohakune	2	0·1	34
Larsen, A., Ohakune	3	..	2
Marshall, F. C., Ohakune	2	..	3
Toland, W. H., Ohakune	2	..	4
Mother Seed (Canterbury and Marlborough)—			
Adams Bros., Sheffield (Line A)	3	0·2	9
Adams, K. and R., Sheffield (Line A)	3	0·2	1
Anderson, A., Southbridge	3	..	9
Annett, C., St. Andrews	2	..	3
Arthur, H. A., Maungati R.M.D. (Line A)	2	..	2
Arthur, H. A., Maungati R.M.D. (Line B)	1	..	1
Baker, S., Tycho R.M.D.	2	..	2
Banks, H. B., Kaiapoi R.M.D. (Line A)	3	..	2
Batchelor, F. E., St. Andrews	3	..	2
Barnes, R., Johns Road, Belfast (Line B)	3	0·2	1½
Barnes, W., and Son, 199 Highsted Road, Styx, N.W. 4	3	..	4
Barnett, R., Dunsandel (Line A)	2	..	6
Barnett, R., Dunsandel (Line B)	2	..	2
Bell, N., Southburn, Timaru	3	..	1
Bennett, J. E., Southburn, Timaru	3	..	1
Biggs Bros., Tycho	2	..	1½

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top—*continued.*			
Mother Seed (Canterbury and Marlborough)—continued.			
Bird, A. M., Timaru Road, Waimate	2	..	2
Black, D. C., Gleniti, Timaru (Line B)	2	..	1½
Botting, A. R., Factory Rd., Temuka (Line B)	3	..	1
Boyle, A. D., Orari	3	..	1
Breakwell, A. J., Tinwald	3	..	4
Breen, J., Levels	3	..	2
Breen, W., Levels	3	..	3
Brosnahan, estate of Mrs. H., Seadown P.O. (Line B)	2	..	5
Brosnahan, Mrs. H. M., Rangitira Valley, Temuka	2	..	2
Brown, G. E., Kaiapoi R.M.D. (Line A)	2	..	4
Brown, G. E., Kaiapoi R.M.D. (Line B)	3	..	5
Bryant and Meeking, 9 Cameron Street, Ashburton	2	..	1
Bulmer, R. J., Darfield	2	..	1
Burnett, W. J., Mina (Line A)	3	..	3
Caird, I., Southburn, Timaru (Line A)	3	..	2
Caird, I., Southburn, Timaru (Line B)	2	..	3
Caldwell, G. D., 165 Russley Road, Upper Fendalton	2	0·2	4
Campbell, C., Waituna, Waimate	3	..	7
Campbell, D., care of J. Campbell, Albury	2	..	2
Campbell, G., Waimate	2	..	3
Campion, C. A., Mount Hutt R.M.D., Rakaia (Line A)	3	..	1
Campion, C. A., Mount Hutt R.M.D., Rakaia (Line B)	3	0·1	3
Campion, C. H., Amberley	3	..	6
Carlow, G. H., St. Andrews	2	..	1
Carr, J., Mount Hutt R.M.D., Rakaia	3	..	2
Carroll, J., Southbridge	2	..	2
Carroll, T. F., Southbridge	3	..	3
Chappell, L. J., Killinchy R.M.D., Leeston	3	0·2	2
Chappell, T., West Coast Road, Yaldhurst P.O.	2	..	6
Chatterton, C. S., Dunsandel	2	..	3
Chatterton, W. V., Dunsandel	2	0·2	3
Cherry Bros., Kaiapoi-Eyreton R.M.D.	3	..	3
Chetnole Ltd., Glenavy	3	..	4
Clark, D., Tycho R.M.D.	2	..	2
Corlett, A. M., Oakwood Settlement, Gleniti	2	..	2
Crawford, J. A., Yaldhurst	3	..	4
Crawford, R. T., Pound Road, Yaldhurst	3	0·2	4
Crawford, T. A., Yaldhurst	3	..	3
Croft, R., Glenlea, Amberley	3	0·8	2
Cross, A. E., Bennetts, via Rangiora (Line A)	2	..	4
Cross, A. E., Bennetts, via Rangiora (Line B)	2	..	1
Cross, A. E., Bennetts, via Rangiora (Line C)	2	..	1
Crossman, D., Tycho R.M.D.	2	..	1
Crowe, D. and J., Waimate (Line A)	3	0·4	8
Crowe, D. and J., Waimate (Line B)	3	..	6
Crowe, D. and J., Waimate (Line C)	2	..	7
Crozier, W. J., Mount Hutt R.M.D., Rakaia	1	..	8
Crump, F., Springston R.M.D.	2	..	1
Dale, P., Guilds Road, Temuka (Line B)	3	..	1

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top—*continued.*			
Mother Seed (Canterbury and Marlborough)—continued.			
Daniel, E., Kingsdown, Timaru (Line A) ..	2	..	1
Daniel, E., Kingsdown, Timaru (Line B) ..	2	..	2
Davidson, G., care of Mrs. J. Kellman, Timaru-Temuka R.M.D. (Line A)	3	..	2
Davidson, G., care of Mrs. J. Kellman, Timaru-Temuka R.M.D. (Line B)	2	..	1
Davidson, J., Oxford Road, Rangiora ..	1	..	2
Dellow, G., St. Andrews (Line A)	2	..	1
De Renzy, J., Winchester	2	..	1
Dillon, J. G., Courtenay R.M.D.	3	0·5	6
Downey, W. O., jun., Halswell	3	..	4
Doyle, P. J., Gleniti, Timaru (Line A) ..	2	0·3	3
Doyle, P. J., Gleniti, Timaru (Line B) ..	2	..	2
Dunlop W. H. G., Christchurch-Greendale R.M.D. (Line B)	3	0·2	4
Elliott, D., Te Ngawai, Albury	1	..	2
Elworthy, A. S., Holme Station, Timaru ..	3	..	1½
Farr, L. E., Bennetts	3	0·2	3
Foley, C., Kerrytown	3	..	2
Forestdale Sheep-farming Co., Box 567, Christchurch	2	..	8
Fowler, J. A., "The Bounds," Hillersden ..	3	0·2	1
France, D., Levels (Line A)	3	..	1
France, D., Levels (Line B)	2	..	1
Franks, L. J., 88 Russley Road, Christchurch, N.W. 3	2	..	5
Franks, W. T., 103 Grays Road, Upper Fendalton	2	..	2
Frazer, J., Levels Valley, Tycho R.M.D. ..	2	..	2
Frazer, T. A., 578 Harewood Road, Christchurch (Line A)	2	..	2
Frazer, T. A., 578 Harewood Road, Christchurch (Line B)	3	0·5	2
Frost, C. H., Balcairn	3	..	2
Fyall, D., Willowbridge	2	..	4
Gainsford, W., care of J. A. Mullins, Tycho R.M.D.	2	..	4
Gardiner Bros., Waitohi, Temuka	2	..	4
Giles, N., Seadown P.O. (Line A)	2	..	1
Giles, N., Seadown P.O. (Line B)	2	..	1
Gillett, G. N. H., Koromiko, Marlborough ..	2	..	3
Goodman, L. L., Levels	2	..	2
Gray Bros., St. Andrews (Line B)	2	..	6
Gray Bros., St. Andrews (Line C)	3	..	6
Gray, J. L., St. Andrews (Line A)	2	..	5
Gray, J. L., St. Andrews (Line B)	3	..	7
Gray, P. B., Hadlow-Tycho R.M.D. (Line A)	2	..	5
Gray, P. B., Hadlow-Tycho R.M.D. (Line C)	2	..	2
Green, J., Gleniti, Timaru	3	..	3
Gregan, J. D., Hunter-Waimate R.M.D. ..	2	..	2
Guy, T. A. and E. B., Courtenay R.M.D. ..	1	..	8
Haines, C., 108 Waimake Road, Harewood ..	3	..	2
Hampton, G. H., 174 Otipua Road, Timaru (Line B)	3	..	1
Harrison-Wilke, E. L., Courtenay R.M.D. ..	2	..	2
Harnett, T., Rangitira Valley, Temuka (Line B)	3	..	2
Harvey, W., Willowby, Ashburton	2	..	3
Hawkens Estate, Hawkens Road, Marchlands	2	..	2
Hayes, G. B., Halkett R.M.D.	3	0·3	1½
Henderson, J. L., Te Ngawai Road, Pleasant Point (Line A)	2	..	2
Henderson, J. L., Te Ngawai Road, Pleasant Point (Line B)	3	..	1
Hewson, Mrs. M. S., Orari	[illegible]	..	3
Hill, J., Pareora West R.D., Timaru (Line A)	3	0·6	1
Hockey, F. W., 306 Wairarapa Road, Christchurch (Line A)	2	0·2	1

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top—*continued.*			
Mother Seed (Canterbury and Marlborough)—continued.			
Hockey, F. W., 306 Wairarapa Road, Christchurch (Line B)	2	0·2	2
Hockey, W. S., 236 Russley Road, Harewood	2	..	2
Howden, J., Fairview, Timaru	3	..	10
Inch, H. V., 104 Ryans Road, Fendalton, N.W. 3	2	..	7
Innes, T. S., Sheffield	3	..	3
Jackson, L., Otipua, Timaru	3	0·4	1½
Jackson, R., Otipua, Timaru	3	0·2	1
Jellie, J., Russley Road, Fendalton (Line A)	2	..	3
Joblin and Welburn, Darfield	3	0·3	6
Johnston, R. H., Dunsandel	2	..	2
Johnston, W., Rakaia	2	..	5
Johnstone, R. C., 19 Elizabeth Street, Timaru (Line A)	2	0·4	5
Keenan, D. J., Kimbell, Fairlie	2	..	2
Kelliher, T., Pleasant Point (Line A) ..	3	..	6
Kelliher, T., Pleasant Point (Line B) ..	2	..	3
Kelliher, T., Pleasant Point (Line C) ..	1	..	1
Kelly, J. E., Studholme Junction	3	0·2	3
Kelynack Bros., Cannington, Cave	3	..	1
Kenyon, Mrs. F., Oxford Road, Rangiora (Line B)	3	..	8
King, G. H., West Belt, Rangiora (Line A)	2	0·2	2
King, G. H., West Belt, Rangiora (Line B) ..	3	0·2	4
King, J. C., Box 82, Timaru (Line A) ..	2	..	2
King, J. C., Box 82, Timaru (Line B) ..	2	..	2
King, W. H., Rosewill-Timaru R.M.D. ..	3	..	4
Kirke Bros., Mill Road, Waimate	3	..	1½
Leonard, T., Temuka	3	..	4
Longman, Mrs. M., Pareora	3	..	4
Lynch, R., Timaru P.O.	3	..	1
McArthur, D. C., Killinchy R.M.D., Leeston	2	..	1
Macdonald, A., Buchanans Road, Sockburn (Line A)	3	..	1
Macdonald, A., Buchanans Road, Sockburn (Line B)	2	..	3
McGowan, D. L., Sefton	2	..	2
McIntyre, D. J., Ashburton	2	..	4
McKee and Clarke, care of W. J. Clarke, Washdike	2	..	9
McLeod, J. A., Tycho R.M.D., Timaru ..	3	..	1
McPhail, W., jun., Mitcham, via Rakaia ..	2	..	4
Markham, C. W., Fairview Road, Timaru ..	3	..	1
Marshall, D., Killinchy R.M.D., Leeston ..	2	0·2	10
Marshall, S. A., Tycho R.M.D., Timaru ..	2	..	4
Martin, W. E., Kaiapoi R.M.D. (Line A) ..	3	..	4
Martin, W. E., Kaiapoi R.M.D. (Line B) ..	3	..	3
Martin, W. E., Kaiapoi R.M.D. (Line C) ..	3	..	4
Meyer Bros., Hook R.M.D., Waimate ..	3	..	1
Millar, J. E., Killinchy, via Leeston ..	3	0·2	3
Morgan, D., Cheviot R.M.D.	2	..	20
Morris, M. J., Willowbridge	2	..	4
Morrison, J. L., Morven (Line A)	2	..	6
Morrison, J. L., Morven (Line B)	2	..	1½
Morrison, T. F., Levels Valley, Pleasant Point	2	..	1½
Morse, D. C., Gleniti, Timaru	2	..	1
Mortland, Mrs. S., Templeton	3	0·2	6
Mowat, A. G., "The Wrekin," Blenheim (Line A)	3	..	1
Mowat, A. G., "The Wrekin," Blenheim (Line B)	3	..	1
Muir, A. D., Seadown R.M.D., Timaru ..	2	..	2
Mulcahy, M., Gleniti, Timaru	2	..	1
Mulcahy, P., Gleniti, Timaru	3	0·4	1
N.Z. Loan and Mercantile Agency, Christchurch, C. 1 (Line C)	3	0·3	5

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top—*continued.*			
Mother Seed (Canterbury and Marlborough)—continued.			
N.Z. Loan and Mercantile Agency, Christchurch, C. 1 (Line F)	3	0·5	3
Oakley, H. R., Eiffelton	2	..	7
Oakley, W., Hororata	3	..	30
Oliver, J., Hororata (Line A)	2	..	4
Oliver, J., Hororata (Line B)	3	0·5	4
Oliver, J. O. J., Box 28, Temuka (Line A)	3	..	1
Oliver, J. O. J., Box 28, Temuka (Line B)	2	..	1½
Oliver, W. R., Hororata	2	..	1
Orr, J. S., Seadown, Timaru	3	0·2	5
Parish, E., Waitohi, via Timaru	2	..	1½
Parker, F. A., Spring Creek, Blenheim (Line B)	3	..	2
Parry Bros., Southburn R.M.D., Timaru (Line A)	3	..	1½
Parry Bros., Southburn R.M.D., Timaru (Line B)	2	.	1
Parry, R., Southburn R.M.D., Timaru (Line B)	3	..	1
Parry, R., Southburn R.M.D., Timaru (Line C)	2	..	1
Patterson, A., East Eyreton - Kaiapoi R.M.D. (Line A)	2	..	4
Patterson, A., East Eyreton - Kaiapoi R.M.D. (Line B)	2	..	1
Patterson, D., Waimate	2	..	2
Payne, Jas., Springston R.M.D.	2	..	3
Pearcy, R., P.B. Grove, Marlborough	2	..	1
Penno, E., Timaru Road, Waimate	3	..	1
Peterson, B., care of T. S. Gillies, Seadown (Line B)	3	..	3
Phillips, W., Springston R.M.D.	1	..	1
Porter, E. F., St. Andrews (Line A)	2	..	6
Porter, E. F., St. Andrews (Line B)	2	..	10
Proudlock, A., East Eyreton - Kaiapoi R.M.D. (Line A)	2	..	4
Proudlock, A., East Eyreton - Kaiapoi R.M.D. (Line B)	2	..	1
Purvis, G., Oxford Road, Rangiora	2	..	5
Pye, R., Lyalldale, St. Andrews	2	..	1
Quinn, M. J., Arowhenua, Temuka (Line A)	2	..	2
Quinn, M. J., Arowhenua, Temuka (Line B)	2	..	2
Randall, J., Koromiko, Marlborough (Line A)	2	0·2	1
Randall, J., Koromiko, Marlborough (Line B)	1	..	1
Randall, J., Koromiko, Marlborough (Line C)	3	..	1
Rapley, G. L., Southbridge	2	..	4
Rathgen, Mrs. I., Killinchy R.M.D., Leeston	2	..	4
Redmond, C., Kimberley R.M.D.	1	..	15
Redmond, W. G., Courtenay R.M.D. (Line A)	2	..	6
Redmond, W. G., Courtenay R.M.D. (Line B)	3	..	6
Rennie, J., Winchester Settlement	2	..	2
Rich, A. J., Kaiapoi R.M.D.	2	..	12
Richmond, W. T., Willowbridge	2	..	5
Roberts Bros., Cannington, Cave	2	..	1
Robinson, L. C., Levels (Line B)	3	..	1
Robinson, R. G., Ltd., Box 4, Papanui	3	..	3
Rose, C. F., Hook R.M.D., Timaru (Line B)	3	..	1
Rouse, J. F., St. Andrews (Line A)	2	..	10
Rouse, R., Pareora	2	..	2
Rouse, W., St. Andrews	2	..	2
Roy, F., Hunter R.M.D., Waimate (Line B)	2	..	1
Ruston, W. J., jun., Gleniti, Timaru	3	..	1½
Sadler, T., Courtenay R.M.D.	3	..	8
Salt, A. J., Fairlie (Line A)	3	..	1½
Salt, A. J., Fairlie (Line B)	2	..	1
Sauer, J., Esk Valley, St. Andrews	3	..	2
Saunders, A. C., 110 Withells Road, Yaldhurst	3	0·2	4
Saunders, F. L., Studholme Junction	2	..	5
Scott, A., Kerrytown	2	..	4
Sheehan, P., St. Andrews	2	..	1

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top—*continued.*			
Mother Seed (Canterbury and Marlborough)—continued.			
Shirlow, E., Kaiapoi R.M.D.	3	0·5	5
Sievwright, R. M., Washdyke (Line B)	3	..	1
Sievwright, R. M., Washdyke (Line C)	2	..	6
Simmons, W., Kingsdown, Timaru	3	..	2
Simpson, F. F., Waikakahi R.M.D., Waimate	3	..	3
Smith, E. A., Springston R.M.D.	3	0·5	25
Smith, G., Winchester	3	..	2
Smith, J., care of J. W. Topham, Seadown R.M.D. (Line A)	3	..	1
Smith, J., care of J. W. Topham, Seadown R.M.D. (Line B)	2	..	1
Smith, J., care of J. W. Topham, Seadown R.M.D. (Line C)	3	..	1
Smith, L. G., Hadlow Road, Tycho R.M.D.	3	..	1
Smith, L. J., Rosewill R.M.D., Timaru	3	..	1
Smith, R. S., St. Andrews	2	..	2
Somerville, H. J. R., Box 44, Timaru (Line B)	3	0·3	26
Somerville, H. J. R., Box 44, Timaru (Line D)	3	..	1
Speechley, E. N., Gordons Valley Road, Maungati R.M.D.	2	..	2
Spillane, A., Temuka (Line A)	3	..	1
Steele, J., Kimberley	2	0·3	2
Steele and Dawson, care of F. Steele, Fernside	2	..	2
Steven, G. H., Rosewill, Timaru (Line B)	3	..	3
Stewart, A., Marshs Road, Templeton (Line A)	2	..	21
Stewart, A., Marshs Road, Templeton (Line B)	2	..	5
Swanson, W., Selwyn	2	..	1½
Talbot, C. M., Hadlow Road, Tycho R.M.D.	2	..	1½
Tallott, H., Cust (Line B)	3	..	1
Thomas, J. W., Grays Road, Upper Fendalton, N.W. 3	3	..	4
Thomson, J. S., Kirwee	3	..	1
Timms, A., Ashley	3	..	1
Topham, W. C., Temuka (Line A)	3	..	2
Traves, H., Levels	2	..	1
Trott Bros., Kingsdown, Timaru (Line B)	3	..	3
Turner, C. W., Halkett R.M.D.	3	0·5	3
Turner, G. A., Halkett R.M.D. (Line A)	2	..	5
Turner, G. A., Halkett R.M.D. (Line B)	2	..	3
Tweedy, S., Dunsandel R.M.D.	2	..	6
Waihi Scouring Works, Winchester	3	0·3	1
Walker, estate of C. E., Christchurch-Greendale R.M.D.	1	..	3
Walker, W. H., jun., Halkett R.M.D.	2	0·2	12
Wallace, D. W., Main South Road, Timaru	3	..	2
Walsh, G. E., Levels	3	..	2
Ward, A., Southburn R.M.D., Timaru	2	..	1
Watson, M. E. M., Dunsandel	2	..	3
Watson, R. G., Cust	2	0·3	4
Watts, E. F., Rangitata Island	2	..	1
Westway, R. J., Christchurch-Greendale R.M.D.	2	..	11
White, W. T., Kaiapoi R.M.D.	2	..	1
Wilson, A., Pareora	3	..	1½
Wilson Bros., Halkett R.M.D. (Line A)	1	..	8
Wilson, C. T., Halkett R.M.D.	2	..	2
Wilson, M., Halkett R.M.D.	2	..	6
Wilson, R. R., Halkett (Line A)	2	..	2
Wilson, R. R., Halkett (Line B)	2	..	3
Wilson, S. M., Sefton R.M.D. (Line A)	2	0·2	8
Wilson, V. W., Tycho R.M.D.	3	..	4
Wright, L. T., Annat (Line A)	2	..	2
Wright, L. T., Annat (Line B)	2	..	2
Wright, estate of Q. A., care of L. T. Wright, Annat	2	..	10
Mother Seed (Otago)—			
Nimmo, C. J., Ngapara	3	..	3

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top—*continued.*			
Commercial Seed (North Island)—			
Hing, Jimmie, Ohakune	4	1·5	10
Commercial Seed (Canterbury and Marlborough)—			
Adams Bros., Sheffield (Line B)	4	0·3	4
Adams, K. and R., Sheffield (Line B)	6	0·3	4
Alexandre, H., Belfast	5	1·0	14
Amor, A. W., Woodend (Line B)	4	..	1½
Applegarth, P. L., Washdyke	4	..	1
Banks, H. B., Kaiapoi R.M.D. (Line B)	4	0·4	3
Bell, L. R., St. Andrews	4	..	4
Berry and Halliburton, 28 Dundas Street, Christchurch	5	0·7	8
Bishop, S., care of D. Crossman, Tycho R.M.D.	4	..	1
Black, D. C., Gleniti, Timaru (Line A)	5	0·8	2
Botting, A. R., Factory Road, Temuka (Line A)	5	..	1
Brodie, R., Rangitata Island	4	0·1	4
Brown H., care of *Gazette* Office, Rangiora (Line A)	5	1·0	6
Burnett, W. J., Mina (Line B)	4	0·2	2
Cague, W., St. Andrews (Line B)	4	..	1
Caird, D. G., Southburn, Timaru	6	..	4
Calder, R. B., Halkett	4	0·3	7
Campion, C. H., jun., Junction Road, Halswell (Line B)	6	..	3
Carroll, F. A., Southbridge (Line A)	5	0·8	1
Cashion, J. J., 168 Yaldhurst Road, Riccarton	4	..	5
Chambers, A. J., Oxford Road, Rangiora	4	0·2	5
Chapman, R. S., Rosewill, Timaru	5	0·2	10
Coffey, M. M., Temuka	4	..	5
Coup, R. A., St. Andrews	4	..	1
Couper, R. P., Washdyke	4	..	2
Curry, W., Winchester	6	..	1½
Curtis, J. J., Yaldhurst	4	0·2	2
Dale, P., Guilds Road, Temuka (Line A)	4	0·2	2
Davidson, J., Otipua, Timaru	4	..	1½
Dellow, G., St. Andrews (Line B)	4	..	3
Eder, W., Sefton R.M.D.	5	..	7
Everest, W. M., care of J. Crozier, Crozier's Road, Christchurch (Line A)	4	..	5
Everest, W. M., care of J. Crozier, Crozier's Road, Christchurch (Line B)	4	..	2
Everest, W. M., care of J. Crozier, Crozier's Road, Christchurch (Line C)	4	..	1
Fenwick, R., St. Andrews	4	..	2
Fogarty, V., Halkett	4	1·1	20
Ford, L., Salisbury	4	..	3
Fowler, G. H., Halkett	4	1·2	3
Gardiner, C., care of A. Shellock, Rakaia	4	1·0	1
Giles, L. W. E., Kaiapoi R.M.D.	4	0·3	4
Gray Bros., St. Andrews (Line A)	4	..	6
Gray, J. L., St. Andrews (Line C)	4	..	10
Gray, P. B., Hadlow-Tycho R.M.D. (Line B)	5	..	8
Guthrie, J. A., Main South Road, Timaru	4	..	1
Hampton, G. H., 174 Otipua Road, Timaru (Line A)	6	..	4
Hardie, A., jun., Winchmore R.M.D.	5	..	1
Hastie, A. W., Springbrook, Pareora	5	0·4	3
Hawkins, A. T., Sheffield R.M.D.	5	..	1½
Hewson H., care of S. Gray, Winchester	4	..	2
Hill, J., Pareora West R.D., Timaru (Line B)	4	..	3
Hunt, K., Washdyke	4	..	1½
Hurford, B., 245 Prestons Road, Christchurch	4	..	1
Hussey, R., care of Mrs. Bakes, 145 Claridges Road, Harewood	4	0·3	5
Jellie, J., Russley Road, Fendalton (Line B)	4	..	5
Jenkins, T. L., Sheffield	4	0·2	2
Johnstone, R. C., 19 Elizabeth Street, Timaru (Line B)	5	..	2

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top—*continued.*			
Commercial Seed (Canterbury and Marlborough)—continued.			
Jordan, C. H., Kaiapoi R.M.D.	6	..	4
Kavanagh, Mrs. M., 50 Ryans Road, Upper Riccarton	4	0·7	10
Kelly, D., Willowbridge (Line A)	4	..	7
Kelly, D., Willowbridge (Line B)	4	..	4
Kelly, D., Willowbridge (Line C)	6	..	8
Kenyon, Mrs. F., Oxford Road, Rangiora (Line A)	4	0·6	10
Kingsbury, G. E. R., Hook R.M.D., Timaru	4	..	2
Kolkman, F. G., 225 Mid Lincoln Road, Halswell	6	0·8	3
Lamb, B., Christchurch-Greendale R.M.D.	4	1·2	1
Leathwick, A., Hook R.M.D., Waimate	4	..	1½
McCullough, S. G., Rangitira Valley, Temuka	6	..	1
Mackle Bros., Kaikoura Suburban	4	..	1
McRobb, A., Mount Hutt R.M.D., Rakaia	4	..	3
Marist Bros., Claremont R.M.D., Timaru	4	..	1½
Marshall, W. H., 101 Windermere Road, Papanui	4	0·2	5
Moore, H. S., Box 4, Kaiapoi	4	0·3	2
Mundy, R., Blakes Road, Belfast	5	0·2	2
Murphy, W., 153 Junction Road, Halswell	4	..	1
Norman, F. J., Springlands, Blenheim	4	0·4	1
Orbell, C. L., Tycho R.M.D., Timaru	4	..	1
Orbell, W. H., Levels	4	..	1½
Palmer, R. R., Orari (Line B)	4	..	3
Palmer, R. R., Orari (Line C)	6	..	2
Palmer, R. R., Orari (Line D)	4	0·7	2
Parker, F. A., Spring Creek, Blenheim (Line A)	4	..	8
Parry, J. P., Southburn, Timaru	4	..	3
Parry, R., Southburn R.M.D., Timaru (Line A)	4	..	1
Payton, J. E., Mid Lincoln Road, Halswell	5	..	4
Pearce, Mrs. J. P., Washdyke (Line A)	4	..	1
Pearce, Mrs. J. P., Washdyke (Line B)	4	0·4	3
Pearse, E. H. F., Landsboro R.M.D., Timaru	4	..	2
Peterson, B., care of T. S. Gillies, Seadown (Line C)	4	0·1	3
Peterson, B., care of T. S. Gillies, Seadown (Line D)	4	..	4
Petrie, H. H., Swannanoa R.M.D.	4	1·0	4
Philips, A., Weedons-Springston R.M.D.	4	0·2	2
Philp, F., Seadown	4	..	4
Pooke, F. J., Pareora	4	..	6
Pye, L., Temuka	4	..	1
Rangiora High School, Rangiora	4	0·2	1
Rice, H., Kaiapoi R.M.D.	4	..	9
Richards, L., Kingsdown, Timaru	4	..	10
Robinson, L. C., Levels (Line A)	4	..	2
Robson, F. H., Box 22, Lincoln	4	0·2	5
Rose, C. F., Hook R.M.D., Timaru (Line A)	5	..	8
Rouse, J. F., St. Andrews (Line B)	4	..	20
Rouse, J. F., St. Andrews (Line C)	4	..	2
Roy, F., Hunter R.M.D., Waimate (Line A)	4	..	1
Roy, F., Hunter R.M.D., Waimate (Line C)	4	..	1
Royds, R. S., 412 Burnside Road, Fendalton, N.W. 1	4	..	15
Sands, W. G., Pareora	4	..	1½
Schluter Bros., Rangiora	4	0·5	4
Scott, estate of J., Southburn R.M.D., Timaru	4	0·3	3
Sharlick, J., Marshlands Road, Ouruhia (Line A)	4	..	4
Sharlick, J., Marshlands Road, Ouruhia (Line B)	6	0·3	6
Shewan, J. A., 3 Nelson Terrace, Timaru (Line A)	4	..	2
Shewan, J. A., 3 Nelson Terrace, Timaru (Line B)	4	..	4

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Aucklander Short Top—*continued.*			
Commercial Seed (Canterbury and Marlborough)—continued.			
Sievwright, R. M., Washdyke (Line A)	4	..	2
Smith, J. and W., Kaiapoi R.M.D.	5	..	5
Somerville, H. J. R., Box 44, Timaru (Line A)	4	..	3
Somerville, H. J. R., Box 44, Timaru (Line C)	5	..	6
South, N. G., Winchester	5	0·5	1
Storer, G., Kaiapoi R.M.D.	4	..	5
Steven, G. H., Rosewill, Timaru	5	..	16
Summerfield, A., West Melton	4	0·3	1
Topham, W. C., Temuka (Line B)	4	..	2
Upston, E. E., Selwyn	4	1·3	1
Wilson, E. R., Junction Road, Waimate	4	..	7
Wilson, M. G., Springston R.M.D. (Line A)	4	1·5	2
Wilson, M. G., Springston R.M.D. (Line B)	4	0·8	2
Worsfield, A. G., Rangiora	4	0·2	3
Commercial Seed (Otago)—			
Young, J., jun., Allanton (Line A)	4	0·7	1
Dakota.			
Mother Seed (Canterbury)—			
Adams, A., Killinchy R.M.D., Leeston	6	..	4
Allen, A., Killinchy, via Leeston	3	..	10
Allen, Mrs. E. M., Killinchy, via Leeston	4	..	1
Anderson, A., Southbridge (Line B)	5	..	2
Banks, R. M., Hororata	4	..	3
Barnett, R., Dunsandel	3	..	8
Brears, W. C., Southbridge	5	..	1½
Buckingham, R. H., Hook R.M.D., Waimate	6	..	1
Burrowes, J., Chertsey	6	..	6
Calder, G., Halkett R.M.D.	4	..	1
Cameron, J. D., Southbridge R.M.D.	6	..	2
Campion, C. A., Mount Hutt R.M.D., Rakaia (Line A)	5	..	10
Chetnole Ltd., Glenavy	5	0·2	4
Cook, R. F., Ilam Road, Bryndwr (Line A)	5	..	3
Cross, A. E., Bennetts, via Rangoira (Line A)	5	..	2
Crozier, W. J., Mount Hutt R.M.D., Rakaia	4	..	3
Gilbert, C., Southbridge R.M.D.	5	..	1
Greenwood, A. A., Southbridge	5	..	2
Inch, H. V., 104 Ryans Road, Fendalton, N.W. 3	4	..	1
Johnson, H. W., Box 12, Dunsandel	3	..	10
Jowers, G. C., Darfield R.M.D. (Line B)	4	..	2
Lewis, C. E., Sefton, R.M.D.	4	..	1
Lynsky Bros., School Road, Yaldhurst (Line A)	3	..	1
Lynsky Bros., School Road, Yaldhurst (Line B)	4	..	2
Lynsky Bros., School Road, Yaldhurst (Line C)	6	..	5
McPhail, W., jun., Mitcham, via Rakaia (Line B)	3	..	2
McPhail, W., jun., Mitcham, via Rakaia (Line C)	4	..	2
Marshall, D., Killinchy R.M.D., Leeston	5	..	15
Moorhead Bros., Southbridge (Line C)	5	..	8
Muirhead, J. H., Laghmor R.M.D. (Line A)	5	..	2
Murphy, J., Lincoln	5	..	4
N.Z. Loan and Mercantile Agency Co., Methven (Line A)	4	..	2
N.Z. Loan and Mercantile Agency Co., Methven (Line B)	4	..	1
Oliver, J., Hororata	6	..	4
Orchard, G. B., Cheviot R.M.D.	5	..	6
Phillips, A. G., Weedons-Springston R.M.D. (Line A)	4	..	1
Phillips, A. G., Weedons-Springston R.M.D. (Line B)	4	..	3
Rapley, G. L., Southbridge	4	..	3
Robinson, R. G., Ltd., Box 4, Papanui	4	..	3

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Dakota—*continued.*			
Mother Seed (Canterbury)—continued.			
Shellock Bros., Te Pirita R.M.D., Rakaia (Line A)	4	..	1
Stewart, A., Marshs Road, Templeton	4	..	5
Walker, estate of C. E., Christchurch-Greendale R.M.D. (Line A)	4	..	4
Walker, estate of C. E., Christchurch-Greendale R.M.D. (Line B)	6	..	2
Wilson, C. T., Halkett R.M.D. (Line A)	4	..	1
Wolff, R. G., Horrelville R.M.D.	5	..	12
Wright, estate of Q. A., care of L. T. Wright, Annat	3	..	6
Commercial Seed (Canterbury and Marlborough)—			
Adams Bros., Sheffield	7	..	1
Adams, K. and R., Sheffield	9	..	1
Aitken, L. L., Ashburton-Methven R.M.D.	8	..	3
Amor, A. W., Woodend (Line A)	9	..	8
Amor, A. W., Woodend (Line B)	9	..	4
Ayrey, A. S., Post-office, Hunter, via Waimate	9	..	1
Barnes, W., and Sons, 199 Highsted Road, Styx, N.W. 4	7	..	2
Barr, H. C., Springston R.M.D.	9	..	8
Bishop, W. J., Southbridge	7	..	4
Breading, A. J., Te Pirita R.M.D., Rakaia	9	..	3
Breakwell, A. J., Tinwald (Line A)	9	..	8
Brodie, R., Rangitata Island	9	..	26
Bryant and Meeking, 9 Cameron Street, Ashburton	8	..	4
Burns, R. A. C., Te Pirita R.M.D., Rakaia	8	..	3
Campion, C. A., Mount Hutt R.M.D., Rakaia (Line B)	8	..	1
Campion, C. A., Mount Hutt R.M.D., Rakaia (Line C)	8	..	7
Carr, J., Mount Hutt R.M.D., Rakaia (Line A)	9	0·2	1½
Carr, J., Mount Hutt R.M.D., Rakaia (Line B)	9	0·2	5
Chappell, A. G. and H. J., Yaldhurst	8	..	3
Chappell, T., West Coast Road, Yaldhurst Post-office (Line A)	8	..	3
Chappell, T., West Coast Road, Yaldhurst Post-office (Line B)	8	..	1½
Chatterton, W. V., Dunsandel (Line A)	9	..	3
Chatterton, W. V., Dunsandel (Line B)	8	..	4
Cherry Bros., Eyreton-Kaiapoi R.M.D. (Line A)	7	..	2
Coffey, M. M., Temuka	9	..	8
Connell, M., Arowhenua, Temuka	9	..	6
Cook, R. F., Ilam Road, Bryndwr (Line B)	8	..	4
Crawford, R. T., Pound Road, Yaldhurst	9	..	2
Cross, A. E., Bennetts, via Rangiora (Line B)	8	..	3
Dowdle, T. S., Springston R.M.D.	9	0·5	8
Downey, W. O., jun., Halswell (Line A)	9	..	1½
Downey, W. O., jun., Halswell (Line B)	9	..	1½
Duncan, T., Rakaia	9	..	3
Dunlop, W. N. G., Courtenay-Greendale R.M.D.	8	..	5
Eder, W., Sefton R.M.D.	9	..	9
Everest, W. M., care of J. Crozier, Crozier's Road, Christchurch	9	..	1½
Fairbairn, J., Springston R.M.D.	9	..	8
Farr, L. C., Bennetts	7	..	2
Fowler, G. H., Halkett R.M.D.	9	0·2	1
Frazer, T. A., 578 Harewood Road, Christchurch (Line A)	9	..	1
Gardiner Bros., Upper Waitohi	7	..	2
Gardiner, C., care of A. Shellock, Rakaia	9	..	4
Gardiner, O. J., Dunsandel R.M.D.	9	..	4
Gimson, W., Mitcham, via Rakaia	7	..	6
Hanna, H., Sefton	9	..	1
Hardy, A., jun., Winchmore R.M.D.	7	..	1½

List of Growers—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Dakota—*continued.*			
Commercial Seed (Canterbury and Marlborough)—continued.			
Harrison-Wilke, E. L., Courtenay R.M.D. ..	8	..	2
Hobday, J. H., 33 St. John Street, Papanui ..	7	..	3
Holmes, A., Mount Hutt R.M.D., Rakaia ..	9	..	3
Hulston, A. J., Greendale R.M.D.	8	..	1
Hussey, R., care of Mrs. Bakes, 145 Claridges Road, Harewood	8	..	5
Inch, C. A., Te Pirita R.M.D., Rakaia ..	9	..	6
Joblin and Welburn, Darfield	7	..	6
Johnston, R. H., Dunsandel	9	..	2
Jowers, G. C., Darfield R.M.D. (Line A) ..	9	..	3
Kavanagh, Mrs. M., 50 Ryans Road, Upper Riccarton	7	..	5
King, G. H., West Belt, Rangiora	8	..	5
McArthur, D. C., Killinchy R.M.D., Leeston ..	9	..	2
McCormick, D., Post-office, Southbridge ..	9	..	1½
Macdonald, A., Buchanans Road, Sockburn ..	8	..	1
McIntyre, D., Digby's Bridge, Ashburton ..	9	..	5
McRobb, A., Mount Hutt R.M.D., Rakaia ..	8	..	5
Mehrtens, F. W., Camside, Rangiora ..	9	..	3
Minogue, J., care of G. G. Smith, Springston R.M.D.	9	..	3
Moriarty, L., Southbridge	9	..	4
N.Z. Loan and Mercantile Agency Co., Christchurch (Line C)	9	..	3
Oliver, H. A., Hororata	9	..	2
Palmer, L. J., Southbridge	8	..	3
Palmer, R. R., Orari (Line B)	7	..	3
Parker, F. A., Spring Creek, Blenheim (Line A)	7	..	2
Parker, F. A., Spring Creek, Blenheim (Line B)	7	0·2	3
Pilkington, R. F., Southbridge (Line A) ..	8	..	1½
Pilkington, R. F., Southbridge (Line B) ..	7	..	2
Royds, R. S., 412 Burnside Road, Fendalton, N.W. 1	7	..	5
Rumble, F. A., P.O. Dunsandel	8	..	4
Schaffer, F. L., Weedons-Springston R.M.D.	8	..	20
Shellock Bros., Te Pirita R.M.D., Rakaia (Line B)	8	..	5
Shellock W., Te Pirita R.M.D., Rakaia ..	7	..	5
Skerton, G., Hornby	8	..	7
Smith, E. J., Prebbleton	7	..	10
Smith, G. G., Springston R.M.D.	8	..	3
Somerville, H. J. R., Box 44, Timaru (Line A)	9	..	4
Steele, J., Kimberley	7	..	1½
Stevenson, T. J., Rakaia (Line A)	7	..	6
Stevenson, T. J., Rakaia (Line B)	9	..	2
Storer, G., Kaiapoi R.M.D.	9	..	6
Summerfield, A., West Melton	7	..	1
Swanson, W., Selwyn	8	..	2
Thomas, C., Springston R.M.D.	9	..	7
Tutton, F. A., Springston R.M.D.	8	..	2
Tweedy, S., Dunsandel R.M.D.	8	..	11
Upston, E. E., Selwyn (Line A)	9	..	9
Upston, E. E., Selwyn (Line B)	9	..	3
Walker, W. H., jun., Halkett R.M.D. ..	8	..	5
Watson, M. E. M., Dunsandel	9	..	3
Wilkinson, V., Mitcham, via Rakaia ..	7	0·4	7
Wilson Bros., Halkett R.M.D. (Line A) ..	7	..	4
Wilson Bros., Halkett R.M.D. (Line B) ..	9	..	8
Wilson, C. T., Halkett R.M.D. (Line B) ..	7	..	1½
Wilson, M., Halkett R.M.D.	7	..	6
Arran Chief.			
Mother Seed (Canterbury)—			
Barnes, R., Johns Road, Belfast	4	0·5	2
Barnes, W., and Sons, 199 Highsted Road, Styx, N.W. 4	4	0·2	3
Batchelor, R. S., Waimate	4	..	1

List of Growers—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Arran Chief—*continued.*			
Mother Seed (Canterbury)—continued.			
Boyce, W. J., Waituna, Waimate	2	..	6
Buckingham, L. H., Hook R.M.D., Waimate	4	..	1
Campbell, P., Studholm Junction (Line A) ..	4	..	1
Campbell, P., Studholme Junction (Line B) ..	4	0·2	3
Cox, S., Box 9, Willowbridge (Line A) ..	4	..	5
Faulkner, J. C., Willowbridge (Line A) ..	3	..	4
Foley, T. J., Waituna, Waimate	3	..	1
Forsyth, J., Willowbridge (Line B) ..	4	..	1½
Hayman, A. B., Studholme Junction (Line B)	3	..	3
Henshaw, F. J., Studholme Junction (Line A)	4	..	7
Hunter, G., Waituna, Waimate	4	0·2	4
Meyer Bros., Hook R.M.D., Waimate ..	3	..	1
Meynell, T. W., Timaru Road, Waimate ..	4	..	4
Millist, C. V., 85 Greers Road, Papanui ..	4	0·2	1
Paul, A., Waikakahi R.M.D., Waimate (Line C)	4	..	2
Reid, J. M., Box 29, Willowbridge (Line A)	3	..	1
Reid, J. M., Box 29, Willowbridge (Line B)	3	..	3
Rollinson, F. A., and Sons, Studholme Junction (Line A)	4	..	6
Saunders, E. E., Studholme Junction ..	3	..	1
Wilson, E. R., Junction Road, Waimate (Line A)	4	..	10
Wilson, E. R., Junction Road, Waimate (Line B)	3	..	2
Wright, L. T., Annat	2	0·2	2
Mother Seed (Otago and Southland)—			
Anderson, A., Box 19, Stirling	4	..	6
Corkery, J., Te Wae Wae	2	0·2	1
Daly Bros., Riverton-Tuatapere R.M.D. (Line A)	4	..	1½
Daly Bros., Riverton-Tuatapere R.M.D. (Line B)	3	..	1½
Griffin, G., Te Wae Wae	3	..	1
Griffin, J. G., Te Wae Wae	3	..	3
King and Norman, Tuatapere	4	..	3
Knowler, C. E., Happy Valley-Riverton R.M.D. (Line A)	3	..	1
Knowler, C. E., Happy Valley-Riverton R.M.D. (Line B)	4	0·3	2
Knowler, H., sen., Te Wae Wae	3	..	5
Lobb, J. H., Tuatapere	3	..	1
O'Brien, T., Te Wae Wae	3	0·2	1
Orbell, A., Waikouaiti	4	..	1
Sim, A. R., Piko Piko, Tuatapere	3	..	1½
Weir, J. G., Box 35, Stirling	4	..	6
Commercial Seed (Canterbury)—			
Blair, C., Willowbridge	5	..	3
Campbell, P., Studholme Junction (Line C)	5	..	3
Cooney, R., Morven	5	..	1
Cox, S., Box 9, Willowbridge (Line B) ..	5	..	6
Faulkner, J. C., Willowbridge (Line B) ..	5	..	5
Forsyth, J., Willowbridge (Line A) ..	5	..	7
Forsyth, J., Willowbridge (Line C)	5	..	3
Hayman, A. B., Studholme Junction (Line A)	5	..	16
Henshaw, F. J., Studholme Junction (Line B)	5	..	9
Hewson, R. H., Seadown	5	0·2	8
Kelly, D., Willowbridge (Line A)	5	..	2
Kelly, D., Willowbridge (Line B)	6	0·3	10
Kerr, L. W., Waikuku R.M.D., Rangiora ..	5	..	3
Lindsay, J., Studholme Junction (Line B) ..	6	..	8
Lindsay, J., Studholme Junction (Line C) ..	5	..	6
Moore, H. S., Box 4, Kaiapoi	5	..	9
Morris, M. J., Willowbridge	5	..	1
Paul, A., Waikakahi R.M.D., Waimate (Line A)	5	..	5
Richmond, W. T., Willowbridge	5	..	2
Robinson, R. G., Ltd., Box 4, Papanui ..	5	..	2

List of Growers—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Arran Chief—*continued.*			
Commercial Seed (Canterbury)—continued.			
Rollinson, F. A., and Sons, Studholme Junction (Line B)	6	..	18
Saunders, F. L., Studholme Junction ..	5	..	3
Scarlet, L. F., Willowbridge	5	..	2
Commercial Seed (Otago and Southland)—			
Anderson, A., Box 19, Stirling	6	1·0	1
Boyce, L., Deborah, via Oamaru (Line A) ..	6	1·0	2
Boyce, L., Deborah, via Oamaru (Line B) ..	5	..	2
Bruce, J. A., Invercargill-Otahuti R.M.D.	5	0·2	2
Bruce, W. C., Invercargill-Otahuti R.M.D. ..	5	0·2	2
Clarke, H. E., Menzies Ferry	5	1·0	2
Dobbie, R., Menzies Ferry	6	0·2	2
Forde Bros., Te Tua	5	1·5	2
Hamilton, G. I., Tuatapere-Pukemaori R.M.D.	5	0·9	3
Harvey, W., Mosgiel	5	..	4
Knowler, H. C., jun., Riverton-Tuatapere R.M.D.	6	0·2	4
Skinner, J. L., North Taieri	5	..	2
Sutherland, H. B. and J., Outram ..	6	0·8	1½
King Edward.			
Mother Seed (Canterbury)—			
Bird, A. M., Timaru Road, Waimate (Line A)	3	..	2
Bisdee, J. C., Clandeboye	3	..	8
Guthrie, A., Orari	3	..	1
Mother Seed (Otago and Southland)—			
Anderson, A., Box 19, Stirling (Line B) ..	3	..	2
Bennett Bros., Tuatapere-Pukemaori R.M.D. (Line B)	2	..	4
Bennett, J., jun., Tuatapere-Pukemaori R.M.D.	3	..	15
Bennett, J. J., Tuatapere-Pukemaori R.M.D.	2	0·2	1½
Breeze, C. H., Mosgiel	3	..	4
Bruce, J. A., Invercargill-Otahuti R.M.D. ..	3	..	1
Corkery, J., Te Wae Wae	3	..	1
Daly Bros., Riverton-Tuatapere R.M.D. ..	3	..	1
Forde Bros., Te Tua	2	..	2
Griffin, G., Te Wae Wae	3	..	1
Griffin, J. G., Te Wae Wae	3	..	2
Hamilton, G. I., Tuatapere-Pukemaori R.M.D.	3	0·2	4
Jenkins, G. R., Tuatapere	3	..	4
Kirk, R., Tapanui	3	..	4
Lobb, J. H., Tuatapere	2	..	1
Milburn, M., Wrights Bush, Gladfield R.M.D.	1	..	2
Ryan, P., and Son, Gorge Road, Southland ..	3	..	1
Stiven, J. E., Paretai R.M.D., Balclutha ..	2	..	2
Taylor, W. G., Mosgiel	3	..	1
Waite, A., Tapanui	3	..	1
Weir, J. G., Box 35, Stirling	3	..	2
Wilson, C. H., Lorneville, Invercargill ..	3	..	2
Commercial Seed (Canterbury)—			
Alexander, J., Hook R.M.D., Waimate ..	4	..	1½
Bird, A. M., Timaru Road, Waimate (Line B)	5	..	2
Newall and Jones, Queen Street, Waimate ..	4	..	1
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2	4	..	3
Commercial Seed (Otago and Southland)—			
Anderson, A., Box 19, Stirling (Line A) ..	4	..	2
Arthur, W., Box 16, Tuatapere	4	0·2	2
Boyce, L., Deborah, via Oamaru	4	..	1
Burgess, D., West Plains, Invercargill ..	4	..	1
Clark Bros., Ryal Bush	4	..	1
Clarke, H. E., Menzies Ferry	4	..	1
Forrester, J., Maheno	4	..	3

List of Growers—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
King Edward—*continued.*			
Commercial Seed (Otago and Southland)—continued.			
Free, A. T., Outram	5	..	3
Graham, J. W., Mosgiel	4	..	3
Gray, J. S., Queenstown R.M.D.	4	..	2
Heenan, T. D., Maungatua	4	0·3	1
Imrie, J., Mosgiel (Line A)	4	..	1½
Imrie, J., Mosgiel (Line B)	5	..	1½
King and Norman, Tuatapere	4	..	4
Meek, W. H., Enfield, Oamaru	4	..	1
Myron, A., Ryal Bush	5	..	2
Norman, W., Tuatapere	4	0·2	2
Skinner, J. L., North Taieri	4	0·2	2
Sutherland, H. B. and J., Outram ..	5	..	1½
Wood, A. E., Dunback	4	..	3
Inverness Favourite.			
Mother Seed (Canterbury)—			
Adams, A. A., Annat	2	..	1
Atkinson, R. J., Annat (Line A)	1	..	6
Atkinson, R. J., Annat (Line B)	2	..	6
Barclay, G. M. M., Riverlands, Waimate (Line A)	3	..	7
Barclay, G. M. M., Riverlands, Waimate (Line B)	2	..	4
Barr, H. C., Springston R.M.D.	2	..	10
Boyce, A., Doyleston	2	..	4
Breakwell, A. J., Tinwald	3	0·4	5
Duff, A. H., Southbridge	2	..	3
Dugan, J. R., Southbridge R.N.D.	2	..	4
Harris, V. C., Gressons Road, Rangiora ..	3	..	8
Hurley, H., jun., Balcairn	3	..	4
Kelly, D., Willowbridge (Line A)	3	..	5
Kennard, J. R., Norton Reserve, Waimate ..	3	..	1½
Lewis, C. E., Sefton R.M.D. (Line A) ..	2	..	6
Lewis, C. E., Sefton R.M.D. (Line B) ..	2	..	2
Lowe, G. J., Coldstream, Rangiora ..	2	..	4
Macdonald, R., Annat	1	..	10
Mehrtens, J. L., Camside, Rangiora (Line A)	2	0·1	4
Mehrtens, J. L., Camside, Rangiora (Line C)	2	0·2	4
Millar, J. E., Killinchy, via Leeston ..	2	..	3
Moore, F. E., Box 65, Rangiora	2	..	2
Payne, A. E., Lincoln	3	..	6
Phillips, A. G., Weedons-Springston R.M.D.	1	..	1
Piner, E., Annat R.M.D.	3	0·2	6
Robinson, R. G., Ltd., Box 4, Papanui ..	2	0·2	1
Ryan, P. F., Weedons-Springston R.M.D. (Line A)	2	..	7
Ryan's Estate, Springston R.M.D. (Line A) ..	2	..	7
Ryan's Estate, Springston R.M.D. (Line B) ..	2	..	5
Schaffer, F. L., Weedons-Springston R.M.D.	1	..	6
Commercial Seed (Canterbury)—			
Amor, A. W., Woodend	4	..	3
Chetnole Ltd., Glenavy	5	0·5	20
Cox, N. H. L., 238 Wairarapa Road, Papanui	5	0·2	2
Hanna, M., Sefton	4	..	7
Hassall, G. H., Kaiapoi R.M.D.	4	..	3
Jenkins, T. L., Sheffield	4	..	1½
Kelly, D., Willowbridge (Line B)	5	..	3
Mehrtens, F. W., Camside, Rangiora ..	4	..	6
Mehrtens, J. L., Camside, Rangiora (Line B)	4	0·1	4
Rose, C. F., Hook R.M.D.	4	..	4
Rouse, J. F., St. Andrews	4	..	2
Ryan, P. F., Weedons-Springston R.M.D. (Line B)	5	..	3
Tiffen, W. A. E., Makikihi	5	..	2
Topp, Mrs. A. M., Sefton R.M.D.	5	..	1½

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Inverness Favourite—*continued.*			
Commercial Seed (Otago)—			
Graham, J. W., Mosgiel	5	..	2
Aucklander Tall Top.			
Mother Seed (Canterbury and Marlborough)—			
Bailey, J., Kaiapoi R.M.D.	2	..	5
Breakwell, A. J., Tinwald (Line A) ..	2	..	2
Breakwell, A. J., Tinwald (Line B) ..	3	..	6
Brown, H., care of *Gazette* Office, Rangiora ..	2	..	6
Frost, C. H., Balcairn	2	..	2
Guy, T. A. and E. B., Yaldhurst-Courtenay R.M.D.	1	..	3
Hardy, A., jun., Winchmore R.M.D. ..	3	..	1
King, G. H., West Belt, Rangiora	3	..	7
Minchington, F. W., Fernside-Rangiora R.M.D.	3	..	4
Oliver, J., Hororata	1	0·2	10
Randall, J., Koromiko, Marlborough ..	2	..	1
Robinson, R. G., Ltd., Box 4, Papanui ..	1	..	3
Steele and Dawson, care of F. Steele, Fernside (Line A)	2	..	10
Steele and Dawson, care of F. Steele, Fernside (Line B)	2	..	4
Watkins, R. H., jun., Bells Road, Rangiora ..	3	..	3
Worsfold, A. G., Rangiora	3	..	5
Commercial Seed (Canterbury)—			
Campion, C. H., Amberley	5	0·2	2
Fell, E. T., Otipua R.M.D., Timaru ..	5	..	4
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line A)	4	..	3
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line B)	4	0·2	2
Rangiora High School, Rangiora	4	0·6	2
Simmons, W., Kingsdown, Timaru	4	..	1
Thomas, S., West Belt, Rangiora	4	1·2	7
Whearty Bros., Wheatstone, Ashburton ..	4	..	1
Epicure.			
Mother Seed (Canterbury)—			
Banks, H. B., Kaiapoi R.M.D.	4	..	4
Macdonald, R., Annat	3	..	5
Robinson, R. G., Ltd., Box 4, Papanui (Line B)	4	..	5
Robinson, R. G., Ltd., Box 4, Papanui (Line C)	4	..	1
Shellock Bros., Te Pirita R.M.D., Rakaia ..	4	..	3
Shellock, W., Te Pirita R.M.D.., Rakaia ..	4	..	1
Wright, L. T., Annat	3	..	4
Mother Seed (Southland)—			
Burgess, D., West Plains, Invercargill ..	3	..	1½
Commercial Seed (Canterbury and Marlborough)—			
Buckingham, L. H., Hook R.M.D., Waimate	5	..	1
Hobday, J. H., 33 St. John Street, Papanui	5	..	7
Marshall, D., Killinchy R.M.D., Leeston ..	5	..	5
Page, S. T., Sheffield	5	0·2	3
Parker, F. A., Spring Creek, Blenheim ..	5	..	1
Arran Banner.			
Mother Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui (Line B)	3	0·2	3
Robinson, R. G., Ltd., Box 4, Papanui (Line C)	3	..	4
Wright, L. T., Annat (Line A)	3	0·2	3
Wright, L. T., Annat (Line B)	4	0·8	5
Mother Seed (Southland)—			
Knowler, H., sen., Te Wae Wae	3	..	1

LIST OF GROWERS—*continued.*

Nane and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Arran Banner—*continued.*			
Commercial Seed (Canterbury)—			
Hobday, J. H., 33 St. John Street, Papanui	5	..	3
Leathwick, A., Hook R.M.D., Waimate ..	5	..	3
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2	5	..	3
Robinson, R. G., Ltd., Box 4, Papanui (Line A)	5	0·2	3
Steele and Dawson, care of F. Steele, Fernside (Line A)	5	..	2
Steele and Dawson, care of F. Steele, Fernside (Line B)	5	..	2
Commercial Seed (Southland)—			
O'Brien, T., Te Wae Wae	5	..	1
Cliffs Kidney.			
Mother Seed (Canterbury)—			
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line A)	2	0·3	3
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line B)	2	..	3
Commercial Seed (Canterbury)—			
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line C)	4	0·5	4
Robinson, R. G., Ltd., Box 4, Papanui ..	4	..	5
Wright, estate of Q. A., care of L. T. Wright, Annat	4	..	1
Majestic.			
Mother Seed (Canterbury)—			
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line A)	3	..	2
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line C)	2	..	6
Commercial Seed (Canterbury)—			
Hobday, J. H., 33 St. John Street, Papanui (Line A)	4	..	3
Hobday, J. H., 33 St. John Street, Papanui (Line C)	4	..	3
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line B)	4	0·7	4
Iron Duke.			
Mother Seed (Canterbury)—			
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line A)	5	..	7
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line B)	5	..	4
Commercial Seed (Canterbury)—			
Croft, R., Glenlea, Amberley	8	..	2
Commercial Seed (Otago)—			
Grant, B., Puerua, Otago	7	..	2
Early Rose.			
Mother Seed (Canterbury)—			
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line A)	5	..	3
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2 (Line B)	3	..	3
Shellock Bros., Te Pirita R.M.D., Rakaia ..	5	..	1
Maori Chief.			
Mother Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui (Line A)	4	0·3	3
Robinson, R. G., Ltd., Box 4, Papanui (Line B)	4	0·3	3

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
Maori Chief—*continued.*			
Commercial Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui (Line C)	5	1·2	5
Robin Adair.			
Mother Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui (Line A)	3	..	2
Robinson, R. G., Ltd., Box 4, Papanui (Line B)	4	0·2	3
Commercial Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui (Line D)	5	..	2
Arran Consul.			
Mother Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui ..	2	..	3
Commercial Seed (Canterbury)—			
Piner, E., Annat R.M.D.	4	1·0	2
Jersey Bennes.			
Mother Seed (Canterbury)—			
Penn, T. A., 27 Normans Road, Christchurch, N.W. 2	3	..	2
Mother Seed (Southland)—			
Burgess, D., West Plains, Invercargill ..	4	..	3

LIST OF GROWERS—*continued.*

Name and Address.	Group No.	Percentage of Foreign Varieties.	Area, in Acres.
American Wonder.			
Mother Seed (Canterbury)—			
Franks, W. T., 103 Grays Road, Upper Fendalton	5	..	3
Arran Cairn.			
Commercial Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui ..	6	..	2
Arran Pilot.			
Commercial Seed (Canterbury)—			
Campbell and Metherell, North Loburn R.M.D.	7	..	4
Early Regent Bolter.			
Commercial Seed (Canterbury)—			
Shellock Bros., Te Pirita R.M.D., Rakaia ..	7	..	3
Great Scot.			
Mother Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui ..	3	..	3
Sir J. G. Wilson.			
Mother Seed (Canterbury)—			
Robinson, R. G., Ltd., Box 4, Papanui ..	4	..	1

Clean, Well-graded Lines Bring Better Prices.

J. O. WALLACE, Instructor in Agriculture, Dunedin.

EXCESSIVE quantities of earth in sacks of potatoes is a matter that gives cause for complaint each year, especially in connection with produce produced in heavy land and placed on the market direct from the field.

There is no gainsaying the fact that with some growers, principally with the speculative grower, no real endeavour is made to prevent excessive quantities of earth entering the sack. Their psychology seems to dictate, "Every little helps, and dirt weighs heavily." Such actions, however, do not help the industry.

It is pleasing to note, however, that many growers appreciate the position.

Where buckets are still used for picking up, farmers are, in many cases, fixing wire false bottoms as illustrated. The false bottoms are constructed of ten-gauge wires spaced at intervals and fixed together where they cross with lacing wire. These let pass to the ground earth which would otherwise find its way into the sacks.

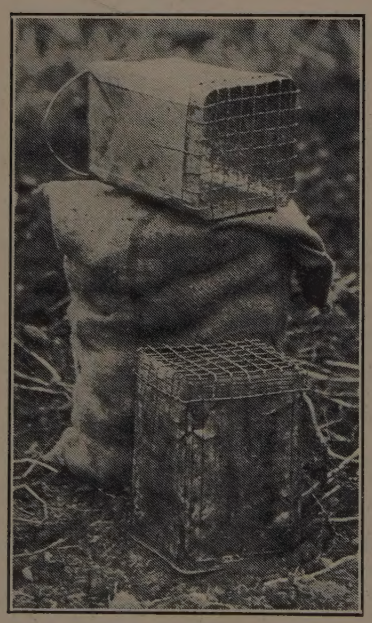


Fig. 1.—False wire bottoms help in preventing earth entering the potato sack.

Fig. 2.—Material like this causes lines to be rejected at the receiving end. The weight of the tubers ranges from 4 lb. to 2 oz.

Badly graded lines are also often the subject of complaint, and it is seldom that such complaint is unfounded. The inclusion of badly shaped or even large tubers with hollow hearts only detracts from the value of a line as a whole. Growers should exclude such material, and, if marketable, dispose of it as a separate line.

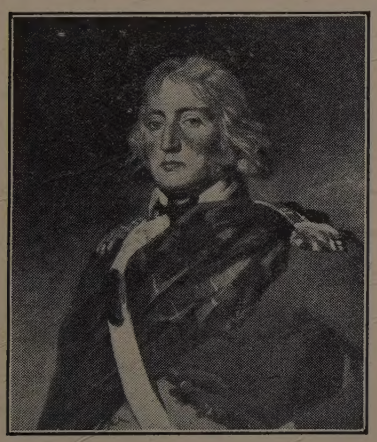
The material shown in Fig. 2 represents a high proportion of a line that was railed a long distance to the ship's side for export and was rejected. Difficulty was found in disposing of the line and the owner had to accept a much lower price than originally offered.

Founders of Modern Agriculture.

J. W. WOODCOCK, Fields Division.

John Sinclair.

AS the originator of agricultural statistics, which are a necessary feature of the farming industry at the present time, Sir John Sinclair (1754–1835) is probably well known. But there are many other institutions for which he is responsible, chief of which is the agricultural show and various Boards and societies which have assisted in the



Sir John Sinclair (1754–1835).

organization of modern agriculture. A man of much energy, and possessed of great organizing ability, he can be regarded as one of the most remarkable personalities of his generation.

Heir to 100,000 Acres.

When Sinclair came into his estate at Thurso Castle at the age of sixteen he found himself heir to 100,000 acres of mainly barren country, and he immediately set out to improve it. Scottish agriculture was then in a most backward state. Most of the fields were unenclosed, the land undrained, and the countryside generally was without decent roads or bridges. Sinclair introduced improved methods of tillage, a regular rotation of crops, the cultivation of turnips, clover, and rye-grass, while under his influence roads were built and rivers were bridged in that hitherto backward part of the country.

After seven years of incessant labour he published a work entitled "Statistical Account of Scotland," in twenty-one volumes, and this was the forerunner of our modern agricultural and pastoral statistics. To obtain the desired information Sinclair made use of the clergy, and to every parish minister in Scotland he sent a circular letter with one hundred and sixty questions dealing with the geography and natural history, population, and production of each parish. The survey is regarded as one of the most valuable works on agriculture ever published, and it was only completed after great difficulties had been encountered.

Founded Wool Society.

In order to promote improvement in quality of wool Sinclair founded the British Wool Society, and this was inaugurated by a sheep-shearing festival near Edinburgh. The sheep-shearing contests became annual events and developed into general agricultural shows—the first regular agricultural show being held by the Highland and Agricultural Society in 1822.

Sinclair founded and became the first President of the British Board of Agriculture, which for many years carried on the valuable work of its founder by conducting agricultural surveys and gave much assistance to the development of agriculture generally.

Sinclair, besides being a great agriculturist, was also a politician of some renown, and for his political services he was knighted in 1786. But what influence he gained from his associations with King and Parliament was always used for the single purpose—the advancement of agriculture.

An English Agricultural Society's showyard at Oxford, depicting the type of shows held during the lifetime of Sir John Sinclair.

Answer to Inquiry.

M. N. (Nelson).—

Could you please give me details of a mineral stock-lick which would be suitable for sheep or cattle on the clay soil of Nelson, near Glenhope?

Live-stock Division:—

There are several types of soil in the vicinity of Glenhope, and on one of these so-called "bush-sickness" occurs. Investigations have shown that the feeding of minute amounts of cobalt will cure and prevent the disease.

A suitable lick may be prepared by mixing 4 oz. of cobalt chloride or cobalt sulphate with 1 ton of agricultural salt. Directions will be found in the article in the January issue of the *Journal* on "Importance of Cobalt." Limonite from North Auckland (Okaihau or Whangarei), procurable through trading firms, may also be used mixed with equal parts of salt.

If the bones of the sheep or cattle are weak or deformed, or the pastures show evidence of a phosphate deficiency and suitable manurial treatment cannot be undertaken immediately, some benefit may be derived from mixing steamed bone-meal in any proportion up to, say, 50 per cent., with either of the above licks

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And Miscellaneous Matter.

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